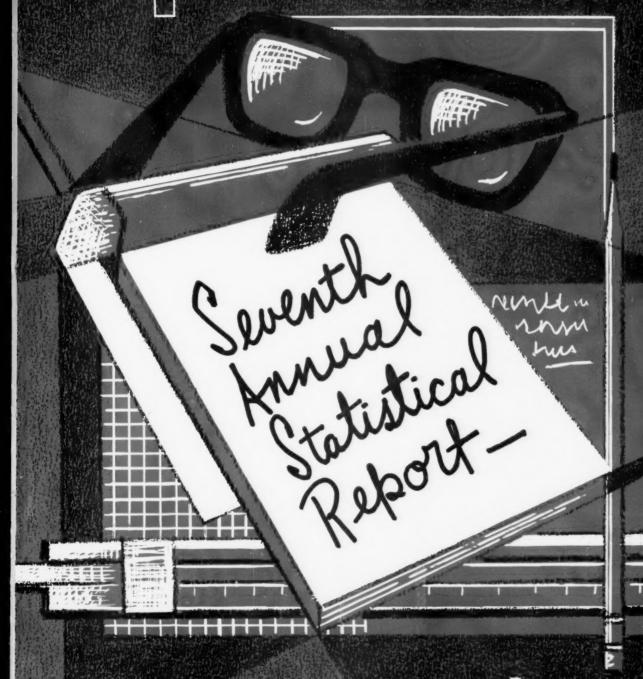
SEPTEMBER 1961

PRICE 75 CENTS

## ELECTRICAL CONSTRUCTION AND MAINTENANCE

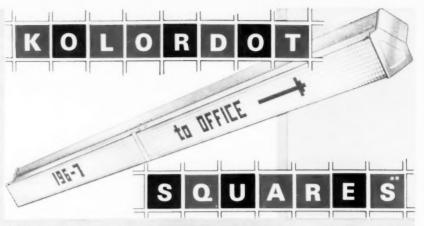
WITH ELECTRICAL CONTRACTING



A McGRAW-HILL PUBLICATION

SOTH YEAR

ACCENT
the beauty
of Gratelite\*
with
GUTH
Kolordots

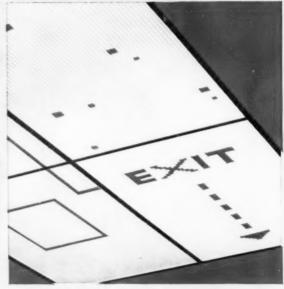


A new dimension of beauty in lighting. Functional and decorative!

KOLORDOTS . . . versatile as the artist's brush. Just "snap, snap, snap" and you see words and designs or mosaic patterns come to life against the luminous glow of Gratelite . . . in ceilings or fixtures.

Four vivid colors — Sapphire Blue, Cardinal Red, Leaf Green and Vibrant Orange.

How can you use Kolordots? Just let your imagination go (and check the examples we show)!

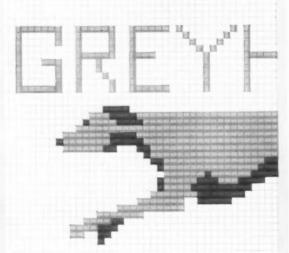




#### KOLORDOTS snap-lock into the %" Gratelite

cubes

in four vivid colors



Point out departments, designate areas or rooms, or just "play Picasso!" K O L O R D O T SQUARES will add new sparkle and beauty to your Gratelite ceiling or fixture.



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THE EDWIN F. GUTH CO.

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WRITE FOR FULL-COLOR BROCHURE

#### All these Square D features make this

# THE SAFEST, MOST RELIABLE COMBINATION STARTER

VISIBLE BLADES You can see the switch is open and know you're safe!

#### **REALLY DUST-TIGHT**

NEMA 5-12 construction keeps out dust and coolant. Positive door-closing mechanism assures complete seal before switch can be operated.

#### DOOR CLOSES SIMPLY and EASILY

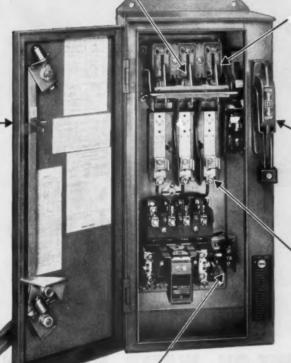
No cover bolts to secure—just push door shut and turn door handle to close and seal.

#### **EASY TO INSTALL**

Through wiring with no interference from disconnect switch. Line terminals are at top, load terminals at bottom. Starters can be ganged with less than % inch between them.

#### WIDE RANGE OF SIZES

New Square D combination starter now available in NEMA Sizes O through 4.



#### 3rd OVERLOAD RELAY

Space to add an additional overload relay when desired.



#### INTERLOCK ON SWITCH Optional sin

Optional single or double-pole interlock available to disconnect separate control circuit power. Assures complete safety!

#### FOOL-PROOF OPERATING MECHANISM

Handle is permanently attached to switch to eliminate hazard of false handle indication. With door open, the switch can not be operated accidentally.

#### CONVERTIBLE FUSE CLIPS

If horsepower or voltage requirements change, modification kits provide easy change of fuse clip size and spacing.

#### NEMA TYPE 1 ENCLOSURE ALSO AVAILABLE

NEMA Type 1 enclosures, offered in Sizes 0 through 4, can be modified by addition of a pushbutton, selector switch or other accessories. Easy-to-use kits simplify field installation.

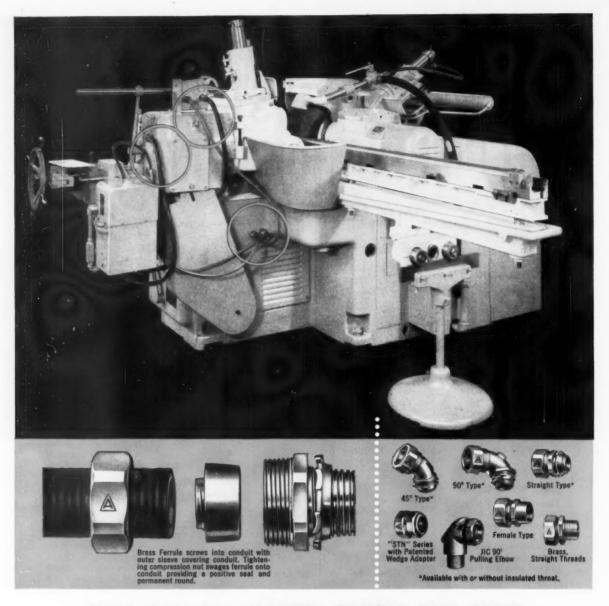


Write for Bulletin SM-292. Address Square D Company,
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#### SQUARE D COMPANY

wherever electricity is distributed and controlled



# SEAL OUT OIL, WATER, FUMES AND DUST WITH EXCLUSIVE APPLETON "ST" SERIES CONNECTORS

Liquid-tight conduit is only as liquid-tight as the connectors used, only as good a ground as the connectors provide.

APPLETON "ST" Series Connectors have been recommended for years because their patented, exclusive construction is simple and rugged — the hallmark of true engineering design. There are only three all metal parts. Nothing to loosen, deteriorate, crack or break. "ST" connectors positively prevent foreign matter from entering wiring systems and at

the same time, provide a permanent ground between connector and conduit

For complete wiring protection and lasting dependability, insist on APPLETON "ST" Connectors—proven best on thousands of critical jobs



1701 Wellington Avenue, Chicago 13, Illinois



#### ELECTRICAL CONSTRUCTION AND MAINTENANCE

With which is consolidated Electic

Published for electrical contractors, electrical departments in industry, engineers consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management in the field of electrical construction and maintenance.

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## Blueprint for Reliability



#### For Performance Plus...Specify Silicone Insulated Transformers

Here's Why—(1) Low cost installation... transformers using silicone insulation systems are up to 50% lighter, 50% smaller and require no costly vaults or barriers. (2) Lower operating costs... silicone insulated transformers are virtually maintenance-free—have no liquids to filter or change—need no space heaters to keep de-energized windings dry. (3) Maximum safety... silicone insulated transformers are completely dry. There's no danger of toxic fumes, or fire. (4) Maximum reliability... silicone insulated transformers operating at 200 C have a longer life expectancy than Class A transformers operating at 100 C. Depending on design, silicone insulated transformers withstand overloads of 25 to 50% above rated capacity. Units have been flooded without damage to windings.

Here's How — Dow Corning silicone insulation has excellent electric strength and is unaffected by thermal cycling and high temperature . . . enables transformer manufacturers to (1) produce lighter, more compact units — units that double capacity without increasing space or weight requirements; or (2) build units that withstand substantial overloads.

Here's What — Silicone insulated drytype transformers in three enclosures: (1) open, (2) enclosed and (3) gas-filled sealed.

Here's Where — For load center substations, a choice of enclosed, open or sealed gas-filled dry-type transformers that require no costly vaults—can be located on roofs or balconies to conserve valuable floor space.

Here's When — Right now! Whether you are planning for future growth, expanding present facilities or replacing old equipment, consider the possibility of using silicone insulated transformers. Initial price is competitive, and, when you consider their lasting values, silicone insulated transformers give you more for your money . . . a whole lot more!

Write today for 8 page brochure entitled "Specify Silicone Insulated Motors and Transformers and Save!"

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#### ELECTRICAL CONSTRUCTION AND MAINTENANCE

SEPTEMBER 1961 continued

Estimating	Foru	m-XIV													. ,			,			1	19
By	RAY	ASHLE	Y-	-1	Fix	ced	1-1	or	ice	7	e	rs	us	3	co	si	[-]	pl	us	S		

contracts.

#### Practical Methods ..... 120

Relight school stadium with Quartzline lamps; frequency indicator; switch from gas to electric operation saves 65%.

#### 

Simple fork protects extension cord for hoist; combination burn-bake electric-gas oven; spray booth and locker have mutual bulkhead.

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Product news announcements; catalogs and bulletins.

#### Reader's Quiz .....

Questions and answers on T-connected transformers; c'rcuit-breaker IC ratings; synchronous

#### 

Answers to code questions on meter-socket installations; switch-leg size; switch positions; grounding temporary installation; switch enclosures.

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Vol. 60, No. 9

ELECTRICAL CONSTRUCTION and MAINTENANCE

SEPTEMBER 1961

Published monthly with an additional issue in September by McGraw-Hill Publishing Company, Inc. James H. McGraw (1860-1948). Founder, Executive, Editorial, Circulation and Advertising Offices (McGraw-Hill Building, 330 W. 42nd St., New York 36, N.Y. Printed in Albany, N.Y. Officers of the Publications Divisions; Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Caliaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator, Daniel F. Crowley, Vice President and Controller, Officers of the Corporation: Donald C. McGraw, President; L. Keith Goodfich, Executive Vice President and Controller, Charles and Charles

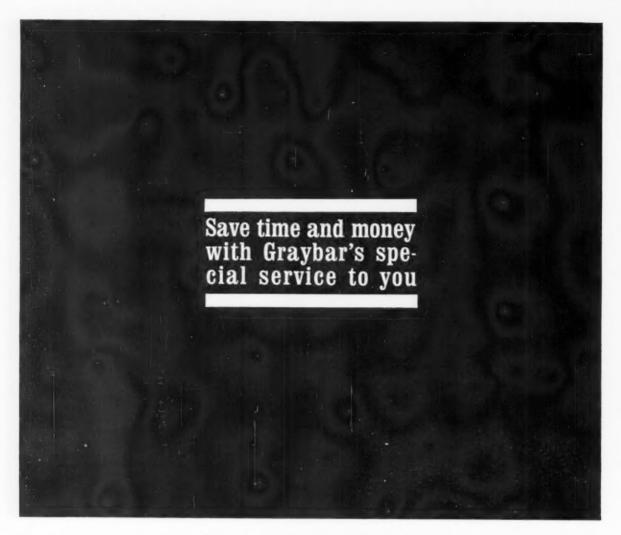
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In the state subscription rate for individuals in the field of the publication \$3.00 per year. This issue 75 cents, Electrical Products Guide \$2.50 Lanada \$5.00 a year. All other countries, \$15.00 a year, payable in the subscription of the subscription of

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#### **Sidelights**

#### PLAN FOR GOOD TIMES

Signs of increased activity across the board in consumer spending, capital investments and government outlays giving new acceleration to the economy and creating a climate for what is expected to be a period of record growth for the electrical industry in the months ahead. This optimistic outlook is drawn by Associate Editor Berlon C. Cooper in our annual statistical summary. His report "Record Electrical Growth in 1962" leads off our editorial feature section this month beginning on page 85.

#### SUBSTATION MAINTENANCE

Outdoor substations on plant grounds and under the supervision of plant personnel are usually so ruggedly designed and built as to require infrequent attention. But their importance to the electrical system is so vital they cannot be neglected. Fortunately, most of the troubles that can crop up are readily preventable by systematic inspection and maintenance. Assistant Editor Robert J. Lawrie details a practical plan of step-by-step inspection and maintenance procedures for a typical industrial substation installation in "How to Plan Outdoor Substation Maintenance" beginning on page 100.

#### TUNNEL LIGHTING

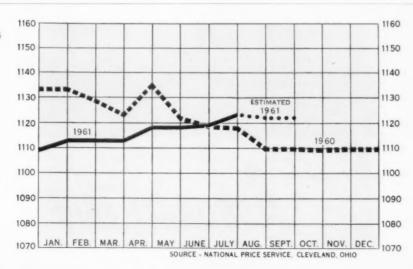
Safety in tunnels is critically dependent on the lighting design, particularly near the portals where drivers' eyes must adjust from intense daylight to the relatively lower levels of tunnel illumination. A case study in the problem and its practical solution is provided by recently-completed Mule Pass in Cochise County, Arizona, described by H. Stead, Traffic Supervisor, Arizona Highway Dept., in "Tunnel Lighting with H. O. Lamps" beginning on page 104.

#### REMOTE METERING

In providing for central individual apartment or office metering in a multiple occupancy building, it is usually necessary to run individual feeders to each tenant thus sacrificing the diversity advantages that could be achieved with common feeders. A new system of remote energy metering promises to permit the full advantage of common feeder design. A specially designed and compensated current transformer in the tenant panel wired to the central meter bank does the trick. The system is described by Associate Editor J. F. McPartland in "Remote Metering System" beginning on page 116.

#### ELECTRICAL MATERIALS

BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT THE VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.





#### **Washington Report**

SEPTEMBER . 1961

The nation's economy is climbing to new records at a spectacular pace. Current estimates of gross national product for the fourth quarter are \$540 billion (seasonally adjusted annual rate), and perhaps as high as \$560 billion for the first quarter of 1962. GNP for first quarter of 1961 was approximately \$500 billion. Included in GNP statistics, however, is government spending—Federal, State, local—which is also spiraling upwards. This helps to confuse the picture of the true status of the economy, but most segments are also showing new strength and setting new records. Consider the following important indicators, for example:

• Industrial output in July climbed to a record high of 112% (FRB Index), exceeding the previous record of 111% for Jan-

uary 1960.

 Construction spending in July hit a record annual rate of \$57.8 billion, up 2% from June rate, and up 5% from July 1960 rate.

Personal income set a new record in July—a seasonally-adjusted annual rate of \$421.8 billion.

 Electric power production set new weekly records in July and August, with latest record totaling 16.14 billion kwhr for week ending August 5.

National debt set a record of \$293.1 billion during the last week in July, highest for any date in the nation's history. Congress only recently raised the legal national debt ceiling to \$298 billion, and the new defense speedup which is officially expected to swell the Federal budget deficit to \$5.3 billion in fiscal 1962 could push the national debt close to the new ceiling during the coming winter months.

Federal spending increases and budget deficits now in the making are giving rise to inflation worries, both in government and out. Spending this year (fiscal 1962, ending June 30, 1962) is rising rapidly. President Kennedy has requested new spending authority of more than \$15 billion during his first six months in office, of which only \$5.7 billion, or 37%, is for defense purposes. The Administration contends that stepped-up business activity could push Federal revenues up as much as \$10 billion in fiscal 1963, based on current tax rates, help meet the increased spending plans, and keep inflation under control. Even so, anti-inflation moves, including a possible clamp down on credit by Federal Reserve System, and standby wage and inventory curbs are being considered and prepared.

New construction spending totaled \$5,433 million in July, up 1% from June, and 5% from July 1960, Commerce Dept. reported. Expenditures for private construction totaled \$3.7 billion, while public construction spending totaled \$1.7 billion. Public construction outlays were up 4% from June, and 8% from July 1960.

More than \$818 million in Federal highway funds, comprising the allocation to states for the last quarter of this year, were released in August by Commerce Dept., on Presidential order, to further aid the economy through accelerated spending.

Congress approved a \$207 million appropriation for a steppedup civil defense program, which President Kennedy had asked for as part of the \$46.7 billion bill for defense. Focal point of the civil defense program is almost sure to be fallout shelters, for both homes and public buildings.

# Index of Phelps Dodge

Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE
	ACV	Armo-Lok	85 C (185 F)	Dry Locations
===+1111111111111111111111111111111111	None	Armo-Lok	85 C (185 F) High Voltage	General Purpose: Consult manufac- turer for specific applications
	w		75 C (167 F)	Mining Machines, Dredges, Shovels,
	G	Portable Power Cable	Low Voltage	and similar portable applications  Pennsylvania Dept. of Mines Flame Resistance Approval P-114. U. S.
	SHD		85 C (185 F) High Voltage	Bureau of Mines Listing P-114-BM.
The same and the second section of the section of the second section of the sect	RHW	Flamestop Heat and Moisture Resistant	75 C (167 F)	Dry and Wet Locations
A MORE - A MORE AND THE STATE OF	RHH	Flamestop Heat- Resistant	90 C (194 F)	Dry Locations
	RHL	Heat Resistant Rubber Lead	75 C (167 F)	Wet Locations and other Special Conditions
PD-X-12-2		PD-X Fibrous- covered, Non- metallic-Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores, and Shops.
PD:XT-12:2	NM	PD-XT Thermo- plastic-covered, Nonmetallic- Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores and Shops
HANDSHAM DEGRACOUNT TYPE UF 14	UF	Perma-Dure		UF: Underground Feeder and Branch Circuit Cable for Direct Burial.
HASIRSHAW PERMA-DURE TYPE UF 14/2	UF-NMC	Nonmetallic- Sheathed Cable	60 C (140 F)	NMC: For Interior Wiring in Moist or Corrosive Locations.
	THW		75 C (167 F)	Dry and Wet Locations
	TW	Habirdure Thermo- plastic insulated	60 C (140 F)	Dry and Wet Locations
	TF		60 C (140 F)	Fixture Wire
	TW	Petro-Dure Thermo- plastic Insulated	60 C (140 F)	Dry and wet locations and where ex- posed to mineral oil Where exposed to liquid gasoline
		Nylon Jacketed	30 C (86 F)	and gasoline vapor.

PHELPS DODGE COPPER PRODUCTS CORPORATION

# Wires and Cables

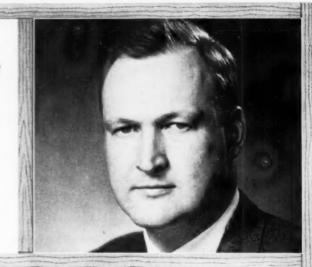


Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE
	TW	Habirdure (9T)	60 C as TW 90 C as Appli- ance Wiring	NEC Type TW Bldg. Wire—60°C Appliance Wiring—90°C in air or 60°C in water or oil
	None	Habirdure Appliance Wire	105 C (221 F) IN AIR 80 C (176 F) IN OIL	Appliance Wiring
	SE	Service Entrance Type SE — Style U Unarmored	75 C (167 F)	Service Entrance or Combination Service Drop & Service Entrance
	SD	Service Drop Type SD	60 C (140 F)	Service Drop
NECTOTIVE USE - 6300-MARRESIAN DIVISION	USE	Service Entrance Type USE	75 C (167 F)	Underground Service Entrance, Direct Burial.
	v	Varnished Cloth Braided	85 C (185 F)	Dry locations only. Smaller than No. 6 by special permission.
	) VL	Varnished Cloth Lead	85 C (185 F)	Wet or Dry locations. Smaller than No. 6 by special permission.
	Name of the last	Habirduct Habirprene	75 C (167 F) Low Voltage	General Purpose for Direct Burial, - Aerial, Conduit and Underground
	None	Habirite Habirprene	85 C (185 F) High Voltage	Duct Installations.
	S or SO	Hard Service Cord	60 C (140 F)	Pendant or portable extra hard usage in damp locations; SO for oil resistance
	SJ or SJO	Junior Hard Service Cord	60 C (140 F)	Pendant or portable hard usage in damp locations; SJO for oil resistance
	SP	All Rubber Parallel Cord	60 C (140 F)	For use in pendant or portable ap- plications in damp locations not sub- ject to hard usage

BUILDING WIRES AND CABLES

# "Concealed telephone wiring? I find it a valuable sales aid—especially with second-time buyers"

SAYS JACKSON F. BLACKMAN, BUILDER OF "BRINTON LEA" HOMES NEAR MEDIA, PA.



"The home buyer is becoming more discriminating all the time," says Jack Blackman, award-winning builder of Media, Pa. "I must plan for as many conveniences as possible in my homes. And one of the most important of these is telephone planning. Prospects recognize its advantages. My salesmen know how promotable it is."

Mr. Blackman is building more than 100 homes in "Brinton Lea." He installs concealed telephone wiring outlets in each home, including one over the front door to accommodate the door answering unit of the Bell System's new Home Interphone. He also puts outlets in garages and laundry rooms, thus providing for every possible telephone location, present and future.

"Most of my customers are second-time buyers who know what they want in a home," Mr. Blackman adds. "That's why I call in telephone company representatives on all my jobs. Pre-planning allows me to place concealed telephone wiring where it's best for the customer—and best for our carpenters."

Your local Telephone Business Office will gladly help telephone-plan your homes. For details on home telephone installations, see Sweet's Light Construction File, 11c/Be. For commercial installations, Sweet's Architectural File, 34a/Be.

#### **BELL TELEPHONE SYSTEM**

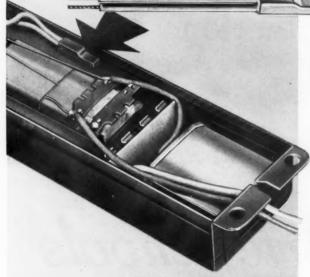


The Country Squire model at "Brinton Lea" near Media, Pa. — featured in American Home as "Best home for the money in Pennsylvania." House and grounds: \$27,000.









# Protects against **PREMATURE** DESTRUCTION

OF FLUORESCENT LAMP BALLASTS . . . AND ELIMINATES THE NEED FOR INDIVIDUAL FUSING.

ADVAN-guard® protects fluorescent lamp ballasts against premature destruction and costly replacement by protecting against abnormal operating temperatures due to incorrect voltage supply, excessive current, lamp rectification, internal ballast short circuiting, inadequate lamp maintenance and improper fixture application.

ADVAN-guard®, a thermally actuated protective thermostat sealed in the ballast housing, automatically 'trips-out' whenever the ballast operates at abnormal temperatures from any internal or external cause. Unlike other protective devices which permit premature ballast destruction by cutting the ballast out of the line only after it has been destroyed, ADVANguard® cuts out before heat can cause premature destruction, resets automatically when the trouble has been corrected and permits the ballast to resume normal operation.

Don't settle for one-time protectors that destroy fluorescent lamp ballasts after a single cycle of abnormal temperatures . . . insist on ADVAN-guard® equipped fluorescent lamp ballasts for safety and longer life.

"The Heart of the Lighting Industry"







# Electrical Protection goes MODERN with BUSS Fuses...



# in All-Electric Schools

Utica Michigan

• Electricity heats, lights, pumps water, cooks and operates all motor driven equipment in the West Utica and the Ewell Elementary Schools. No other utility service is used except the telephone.

The complete use of electrical energy puts special emphasis on the need to use the safest, most modern protective devices throughout the electrical system.

In each school, the main switchboard is protected by 3—1600 ampere BUSS Hi-Cap fuses having an interrupting rating of 200,000 amps. rms symmetrical. Thus, safe interruption of fault currents now available is assured,—and the fuses are adequately safe to allow for future system growth.

If a high fault current should occur, the fast opening characteristics of BUSS Hi-Cap fuses further protect the circuits and equipment against damage by restricting let-thru fault currents to safe value.

Feeder and branch circuit protection

To provide the safest short-circuit and overload protection... and to prevent needless outages,—FUSETRON dual-element fuses are used in the feeders and branch circuits of these schools.

For modern, all-purpose protection of circuits up to 600 amps., FUSETRON fuses cannot be equalled. They have 100,000 amp. interrupting capacity,—and sufficient time-lag to hold harmless overloads.

For more information on

FUSETRON dual-element fuses
... write for bulletin FIS

BUSS Hi-Cap fuses

... write for bulletin HCS

BUSSMANN MFG. DIVISION, McGraw-Edison Co. St. Louis 7, Mo.



# EWELL ELEMENTARY SCHOOL Architects— SMITH & SMITH / ASSOCIATES Royal Oak, Michigan Consulting Engineers— B. A. KING & ASSOCIATES, INC. Birmingham, Michigan Electrical Contractors— SCHEPER'S ELECTRIC CO. Utica, Michigan General Contractors— Ewell Elementary School GILBERT & KERNER Utica, Michigan West Utica School CHISSUS CONSTRUCTION CO. Birmingham, Michigan 196 Switchboards protected by BUSS Hi-Cap and FUSETRON dual-element fuses. WEST UTICA SCHOOL

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . SEPTEMBER, 1961

MGREASE



#### American Steel and Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors United States Steel Export Company, Distributors Abroad

# PARAMINI THE PAGE 17 45%

## ...with (USS) Amerzone-B insulation\*

Amerzone-B butyl rubber insulation can be safely operated continuously at 90°C copper temperature. This means you get a 45% increase in current-carrying capacity with Amerzone-B as compared to the capacity of standard 60°C rated compounds. For network service, Amerzone-B will withstand emergency overload copper temperatures *up to 260*° for short periods without damage. No other rubber insulation has such exceptional resistance to heat, moisture, ozone and cold. You can bend it at —40°F. without cracking. Ozone tests to industry standards show no damage to this dense, nonporous insulation. Amerzone-B insulated cables installed over 12 years ago are just as good today as they were when installed. It's the ideal insulation for 5,000 to 15,000-volt cable. You can use USS Tiger Brand type RR Cable with Amerzone-B insulation anywhere . . . bury it, put it in conduits or ducts, string it overhead.

USS Tiger Brand type RR Cables are also made with other types of rubber insulation, each one compounded to do a special job. For complete information on Amerzone-B insulated cables or any other Tiger Brand Cable, call our nearest Sales Office or write American Steel and Wire, Dept. 1241, Rockefeller Building, Cleveland 13, Ohio.

USS, Tiger Brand and Amerzone-B are registered trademarks

\*Conditions: 3 single conductors # 4/0 in 21/2" conduit (exposed & enclosed), 40°C ambient air temperature



Twenty Years Proof of savings, safety and reliability comes when you specify insulation based upon Geon vinyl compounds. Manufacturer after manufacturer knows it—that's why so many choose Geon vinyl again and again. There's another advantage, too: Using Geon compounds assures uniform high quality, since B.F.Goodrich Chemical has built its reputation through such dependability for two decades.

Geon compounds make insulation really weatherproof.

No question about moisture resistance. No problems of aging, or exposure to oil or grease. And the best part is that you get superior performance at no extra cost to you.

There need be no confusion on quality—just specify Geon vinyl. Your supplier can provide performance data, or you can write Department NQ-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

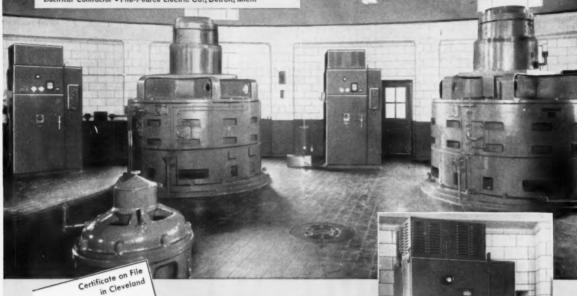
#### **B.F.Goodrich Chemical**

a division of The B.F.Goodrich Company



Wayne County Drain Commission, Wyandotte Pumping Station, recently equipped with two new Fairbanks-Morse pumps and motors

Consulting Engineers • Hubbell, Roth & Clark, Inc., Birmingham, Mich.



# Certified Fault Protection WITHOUT FUSES!

## EC&M Fuseless Starters ELIMINATE FUSE PROBLEMS&COSTS

Now you can get <u>full</u> fault protection without the problems associated with fuses. EC&M's <u>fuseless</u> starters have <u>certified</u> interrupting capacities of 100,000 KVA at 2400 volts, 150,000 KVA at 4800 volts—an important consideration when starters were selected for the 1250-hp, 4800-volt starters at Wyandotte Pumping Station. This inherent fault protection is an EC&M"exclusive"—and is available with no first-cost premium.

EC&M starters are safe and easy to maintain. A three-way door interlock gives positive personnel protection, and an interlock is provided between the contactor and disconnect switch. Disconnect blades are <u>visible</u> in the open position when the door is open. No roll-out or draw-out needed for maintenance. All six contacts can be replaced without special tools in 10 minutes or so.

These cost-saving features make EC@M starters the logical choice for 2200-4800 volt motor drives.

#### TYPICAL SAVINGS WITH ECAM STARTERS

ECAM ST	ARTE	RS				
		ECaM Fuseless Starter				
Cost of 1250-hp 4800-volt Starter	\$xxx.xx	Same as Fused Starter				
Spare Fuse Costs: Set of 3 Spare Fuses for 1250 hp	\$470.00	0				
		1-00				

SAVE per starter, up to \$500
(more on larger motors)
...with EC&M Fuseless Starters

Walte FOR DETAILS . Ask for Bulletin 8130

Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio



#### SQUARE D COMPANY

EC&M DIVISION . CLEVELAND 28, OHIO

wherever electricity is distributed and controlled

6520

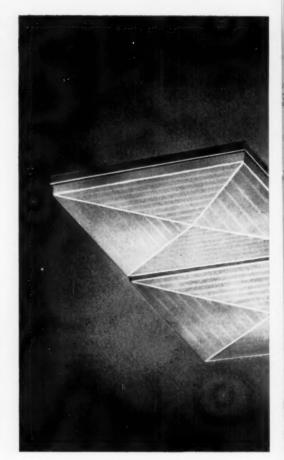
#### HOLOPHANE

Lighting Research

Develops a Totally

New Type of

Surface-Attached Luminaire



# CONTROLLED ILLUMINATION

# CONTOURED TO



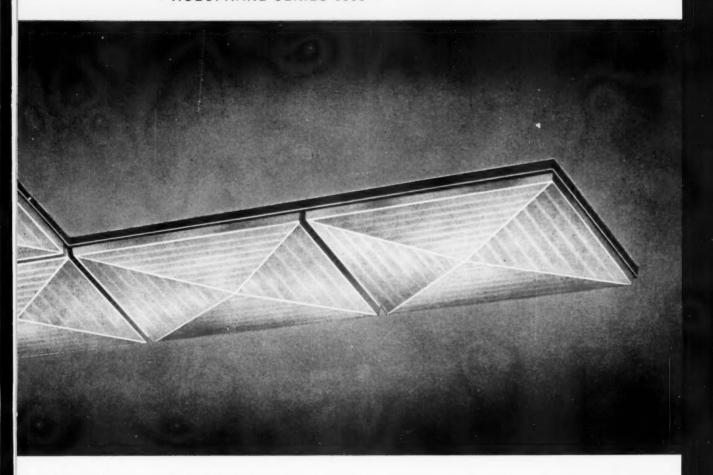
THE "NEW LOOK" IN LUMINAIRES ... Extremely slim, crisp-lined 6600 Luminaires conform with all modern interiors ... Their high-level lighting increases efficiency in offices, libraries, banks. drafting rooms.



BETTER LIGHTING FOR EDUCATION... Flexibility of Series 6600 permits wide use in classrooms, laboratories, lecture halls... The prismatic CONTROLENS produces maximum light, total elimination of glare.



PANELS FOR SPACIOUS INTERIORS... In large department stores, showrooms, shopping centers these new luminaires assure comfortable viewing, speedy selection, satisfied customers and increased volume.



# ANY AREA!

The dramatic advances of the "modular era" have posed new problems for lighting... To meet the challenge Holophane Engineers developed Series 6600—introducing a distinctive new luminaire and a startling concept that permits almost unlimited flexibilty of design.

Using the basic 2 ft. x 4 ft. component, containing acrylic plastic CONTROLENS®, these luminaires can be contoured to fit any area. They can be installed as single units—or aligned for continuous runs—or massed in panels—or tailored to go around corners... Their great versatility satisfies the designer who seeks *one* luminaire, for *all* lighting requirements throughout an entire structure.

Add to these advantages, the quality features found in all Holophane lighting products—prismatic control for highest utilization of light, visual comfort, enduring construction and economy in installation and maintenance.

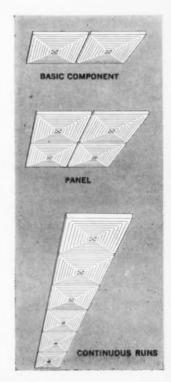
Write for Engineering Data

HOLOPHANE COMPANY, INC. Lighting Authorities Since 1898

342 Madison Avenue, · New York 17, N.Y.

THE HOLOPHANE CO., LTD., . 418 KIPLING AVE. SO., . TORONTO 18. . ONTARIO







VESTIBULE AND LOBBY TELEPHONES, for communication with apartments, may be combined with mail boxes and alphabetical directories. New, modular design, cordless loudspeaking.



APARTMENT TELEPHONES, with new electronically-produced signals, are modern and streamlined. Simple, plug-in construction reduces installation costs, facilitates maintenance.



"LIFE"-SIZE MAIL BOXES do not bend or tear full size magazines or other mail because of the full-opening door design. Two-piece construction cuts down installation time, simplifies maintenance.



NON-ELECTRIC DOOR CHIMES are completely mechanical and provide lowest cost installation. Models available are: colonial knocker, pushbutton, one-way mirror viewer (illustrated).

#### Only Auth Offers A Complete Line of

#### **APARTMENT HOUSE COMMUNICATION EQUIPMENT**

More and more architects, contractors and distributors are calling on Auth for apartment house equipment. The reasons? Auth offers the widest selection of apartment house telephone systems, mail boxes and non-electric door chimes available anywhere in the country. This means you can meet all your requirements from one dependable source. And—no matter how extensive or complex the installation, you're assured of identical high quality and

efficiency throughout the building.

Most important for cost-conscious builders and contractors, Auth's 70 years of experience in manufacturing communication equipment for apartment house service means that every Auth product is engineered for easy, low cost installation, and minimum maintenance.

Auth "Life"-Size Mail Boxes, Vestibule-to-Apartment Telephone Systems, and Non-Electric Door Chimes pictured above are typical of the quality equipment supplied by Auth for thousands of modern apartment buildings. Many other types and models are included in the Auth catalog to meet virtually every apartment house requirement.

If you are not yet acquainted with Auth apartment house equipment, write for new Auth Catalog Section AM today. A copy is yours for the asking, without obligation.



Auth Electric Company, Inc.

MANUFACTURERS OF APARTMENT HOUSE TELEPHONE SYSTEMS, MAIL BOXES, DOOR CHIMES, AND BELL SYSTEMS



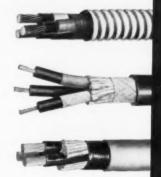
#### CABLE THAT MEETS TOMORROW'S NEEDS

Electrical engineering research programs being conducted in colleges and universities are vital to the continued progress of our industry.

Circle Wire & Cable is glad to cooperate fully with the universities to help assure the success of their projects. Circle has supplied reels of cable on a loan basis to a number of colleges engaged in the development of basic data on the behavior of cable under unusual conditions. At the University of Kentucky, for example,

tests are being conducted, using Circle multiconductor cable, to develop basic data on skin effect and proximity effect on cable operated at 400 to 600 cps, 3 phase loading.

The results of these University of Kentucky tests and other basic research data developed in university laboratories contribute significantly to better cable design. This is the goal we continually strive for at Circle. Specify Circle cable on your next job ... there's no finer cable made.





#### CIRCLE WIRE & CABLE CORP.

SUBSIDIARY OF CERRO CORPORATION

PLANTS: Maspeth and Hicksville, N. Y. SALES OFFICES & WAREHOUSES: In all principal cities.

RUBBER COVERED WIRE & CABLE - VARNISHED CAMBRIC CABLE - PLASTIC INSULATED CABLE - NEOPRENE SHEATHED CABLE - CIRTUBE\* EMT



Ceiling for the new California Bank main branch in Los Angeles. Interior designer, Henry Dreyfuss. Installed by Harold E. Shugart Co., Los Angeles. Ceiling made from Bakelite Brand rigid vinyl sheet panels by Cepco, Inc., San Francisco, California.

# A Bank Draws High Interest On Its LONG-TERM INVESTMENT IN LIGHTING

There's a friendly, refreshing note in this Los Angeles bank's brilliant lighting. Glare-free and shadowless, the luminous ceiling is a snowy expanse of translucent BAKELITE rigid vinyl sheets suspended beneath fluorescent fixtures. The huge panels, four feet square, consist of a top and bottom sheet with an air space between and are placed in a metal frame under tension to facilitate handling. For years to come, the ceiling will stay as beautiful as it is. Accelerated aging tests show high resistance to ultra-violet light.

**Now...high impact resistance!** Bakelte rigid vinyl sheets are now available with *new high impact qualities* that provide extra resistance to hard knocks...the wear and tear of installation and maintenance... cracking

and warping. These sheets are normally unaffected by moisture and detergents, and, because of their light weight, they are easy to install, remove, and maintain.

New designs or renovations can be given a lift with better lighting. Install luminous ceilings made with high-impact Bakelite rigid vinyl sheet. For information, write Dept. IX-41H, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto 12.

Bakelite and Union Carbide are registered trade marks of Union Carbide Corporation.



# ONLY LIQUID-TIGHT FITTINGS OFFER **ALL THESE** BENEFITS

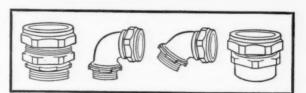
MAXIMUM PULLOUT. Extensive lab testing has proved conclusively that Gedney Liquid-Tight Fittings equal or exceed the breaking point of liquid-tight conduit...connections start tight and stay tight through extra years of service life.

**RE-USABILITY.** Gedney Liquid-Tight Fittings can be used again and again without destroying the *brass* grounding ferrule ...the liquid-tight conduit is never damaged or made unserviceable in any way.

**POSITIVE SEAL.** Even the highest viscosity lubricants, oils or other liquids cannot penetrate the never-hardening vinyl sealing ring. The seal also effectively bars chemicals, fumes, dust and other foreign matter...Gedney Liquid-Tight Fittings perform better, longer, more reliably.

WIDE RANGE OF SIZES. Straight and 90° fittings from 3's in. through 4 in.-45° through 2 in.-combination rigid to liquid-tight from ½ in. to 1 in.

INSULATED THROAT. Available in sizes 1/2 in. through 2 in.



INDESTRUCTIBLE MALLEABLE IRON. Heavily plated ... the toughest metal known for fittings. Offers highest thread strength. Resists sharp blows and vibration.

When you can't take a chance on quality, specify GEDNEY Liquid-Tight Fittings. They're the finest you can buy. For descriptive literature, write or call:



GEDNEY ELECTRIC COMPANY, INC. 1270 Sixth Ave., Radio City, N.Y. 20

270 Sixth Ave., Radio City, N. Y. 2 Foundry, factory and shipping point: Terryville, Conn.



# Collyer POWER CABLE with INTERLOCKED ARMORanother progressive contribution to BETTER POWER CABLE and BETTER INSTALLATION PROCEDURE...

Here is why and how it will help you

#### 'Assured Reliability

On installations in general and on critical applications in particular, Collyer Power Cable with Interlocked Armor provides the assurance and peace of mind which most people need and want. Because this cable eliminates on-the-job assembly of cable and conduit, it eliminates the hazards of strain and damage to which cable is frequently subjected when pulled into conduit. You are assured that the installed cable, free from installation strain or damage, retains all the original factory quality—so that it not only works when first energized but also provides maximum service life as well.

#### Important cost factors

Here in one assembly, "conduit" and cable are installed simultaneously. Factory-assembled Collyer Power Cable with Interlocked Armor can be installed faster and easier than the conduit and cable combination it replaces. Gone is the time and cost of cutting and fitting conduit. Gone is the cost of pulling cable . . . and the risk of delay or added cost due to cable damage caused by pulling. Space is saved, too, because the O.D. of Collyer Power Cable with Interlocked Armor is less than the O.D. of conventional cable plus conduit.

#### Flexibility

The flexibility of Collyer Power Cable with Interlocked Armor is another important feature.

Whether the job involves new wiring, re-wiring, or re-locating existing wiring, obstructions present no problem because Collyer Power Cable with Interlocked Armor can be trained over, under, or around obstacles easily and neatly.

#### A Variety of Constructions

Collyer Power Cable with Interlocked Armor is available in many different designs to meet all kinds of special needs. The Armor may be aluminum, galvanized steel or bronze. The cable can be furnished with an overall protective sheath of polyvinyl thermoplastic where conditions require such precautions. Conductors are available with rubber, varnished cambric, varnished dacron and glass, silicone, asbestos, or plastic insulations depending on the particular requirements.

For more information ask your Collyer Distributor or Agent, or write for Specification Data Sheets to COLLYER INSULATED WIRE CO., 265 ROOSEVELT AVENUE, PAWTUCKET, RHODE ISLAND.

# Collyer Cables

LOOK FOR THIS DISPLAY AT YOUR ELECTRICAL DISTRIBUTOR

new too FRE



WITH PURCHASE OF SPECIAL WRAP-CAP\* WIRE CONNECTOR PACKAGE

SUPER LEVERAGE. 2 CRIMP DIE SIZES-RIGHT-ANGLE INDENTS-SHEAR-TYPE CUTTING-FORGED STEEL TOOL-PLASTIC GRIPS -TWISTS, CUTS, CRIMPS

Offir repres December 31, 1961

special offer

New Crimp Tool ..... \$425 50 Large Connectors.... 393 300 Small Connectors . . 835

you pay only...**\$11**28

CRIMP and WRAP-CAP NOW IN 2 SIZES . . . LARGE and SMALL

ORIGINAL STEEL SLEEVE ... ... WRAP-CAP THE UNIQUE "DIAPER-WRAP"



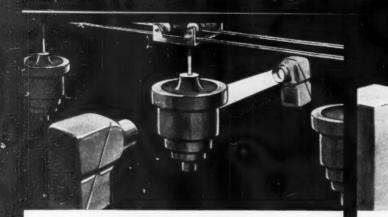




Splices from one #18 with one #14 up to two #10 with two #14.

Splices from one #14 with eng #16 up to one #6 with two #8.

IDEAL INDUSTRIES, Inc. . Sycamore, Illinois



#### PRODUCTION COUNTING

**Problem:** Stepped-up production rate made it difficult to count units accurately with existing mechanical equipment.

Solution: Plant Electrician installed two low-cost G-E photoelectric units connected to automatic counter. Even though production units come in bursts of over 150 per minute, this simple counting setup now tallies them swiftly and accurately.

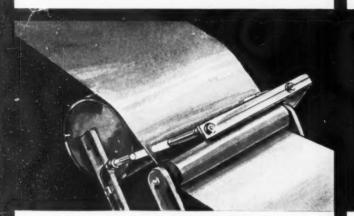


#### SORTING DISSIMILAR CARTONS

**Problem:** To automatically divert selected boxes from main conveyor to side conveyor.

Solution: Plant engineer suggested printing black circular marks on those boxes to be diverted. The absence of reflected light from the marked boxes trips the G-E photoelectric units and switches boxes to side conveyor. Unmarked boxes continue straight ahead on main conveyor.





#### DETECTING WEB BREAKS

**Problem:** Paper mill experienced excess losses caused by web breaks and decided to investigate automatic detection equipment.

Solution: At G-E Application Engineer's suggestion, plant installed photoelectric web-break detectors. These units detect breaks instantly. Light penetrates through break to scanning photoelectric relay which immediately stops machine.



#### SENSING LIQUID LEVEL

**Problem:** Brewery planning to add 10 new vats wanted to equip them with most economical liquid level control.

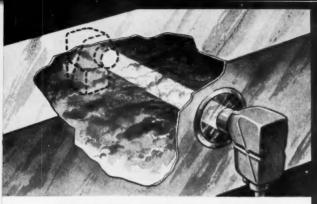
**Solution:** At the Plant Electrician's suggestion, General Electric resistance-sensitive relays with stainless steel probes were installed on each vat. These standard devices have only one moving part, are easy to install, and require little maintenance.



#### A complete line of photoelectric and electronic devices for controlling, sorting, limiting,



- 1. Explosion-proof relay is high-speed type in special enclosure for use in hazardous locations.
- Smoke density indicator is designed for combustion control or alarm: range is adjustable from 3—100%.
   High-speed relay offers .001-second sensitivity. It also includes time delay and interlock.
- 4. Long-distance relay will operate up to 2500 feet without adverse effects from ambient light.
- 5. Voltage-sensitive relay operates on input signal voltage that ranges above or below pre-selected value.6. General-purpose relay is low-cost, indoor-type photo-
- General-purpose relay is low-cost, indoor-type photoelectric relay, flexible to operate, easy to adjust.

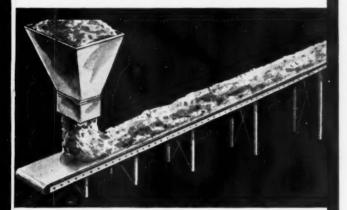


#### MEASURING BURNING EFFICIENCY

**Problem:** To determine that furnace was operating economically, and well within local smoke ordinances.

Solution: Plant Engineer installed G-E electronic smoke density indicator. In addition to performing corrective action, the indicator coupled with a strip chart recorder gives a day-by-day record of burning efficiency. It also satisfies local authorities that smoke is within prescribed limits.





#### **AUTOMATIC CONVEYOR UNLOADING**

**Problem:** Plant wanted to prevent reversing of loaded conveyor upon shut-down of hopper.

Solution: Plant Electrician wired simple electronic timer to hopper switch and to conveyor motor. When hopper closes, timer starts, counts off 45 seconds (long enough for conveyor to dump load completely), then stops conveyor automatically.



### CONTROLS FOR AUTOMATION

# SOLVED with General Electric

These six production problems, and hundreds like them, are today readily solved with versatile General Electric electronic devices.

electronic devices

Applied with ingenuity, these devices now help plants sort, divert, detect, count, and perform other operations efficiently. And new uses turn up every day. For instance, the G-E resistance-sensitive relay is often used to control liquid level, but recently, it proved equally valuable as a thread-break detector!

Cash-in on such new uses of these versatile devices by contacting your authorized G-E Distributor early. He can solve many of your problems with electronic devices from stock. And his experience is invaluable on complex applications.

And for additional information on new ways to apply G-E electronic devices, return the coupon for your free copy of GEA-6822. General Electric Co. Specialty Control Dept., Waynesboro, Va.

Progress Is Our Most Important Product



#### counting, and detecting applications

7. New high-speed relay is a low-cost unit for use with miniature or micro-miniature source and cell.
8. Transistorized relay features high reliability with

miniature and micro-miniature source and cell.

9. Resistance sensitive relay operates on change in ex-

ternal resistance, ideal for liquid-level control.

10. Electronic timer is dial-set for given time; can be energized or de-energized before the timed interval.

11. Light sources and receivers are available in standard, miniature, and micro-miniature sizes.

12. Self-contained relay is low-cost, compact, tubeless photoelectric relay, ideal for limit-switch-type applications.

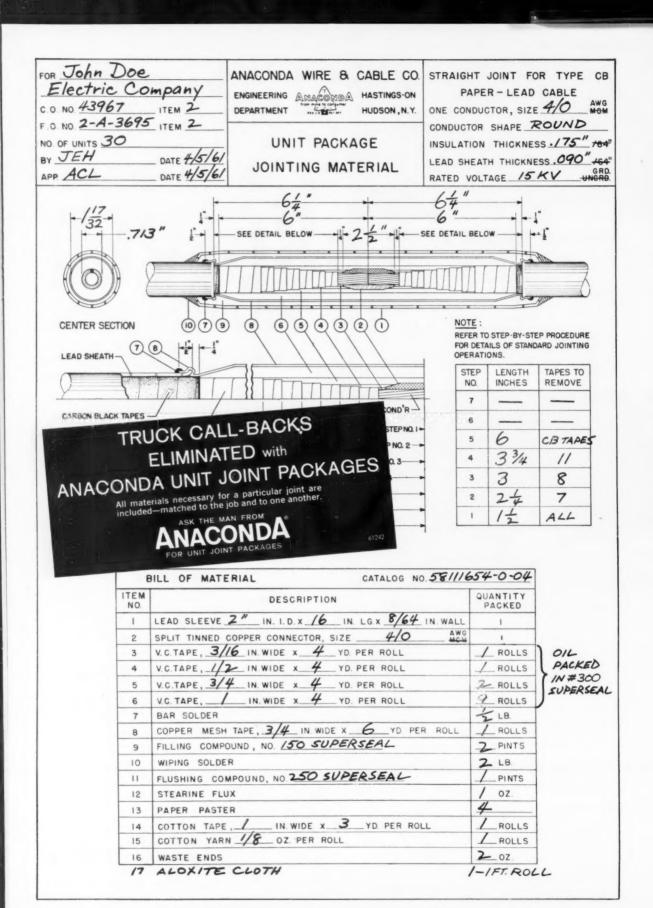
#### FREE CATALOG

General Electric Co., Section E793-05 Schenectady 5, New York

Please send me a copy of the G-E Electronic Devices catalog, GEA-6822, with description, specifications, and pricing data on the complete line.

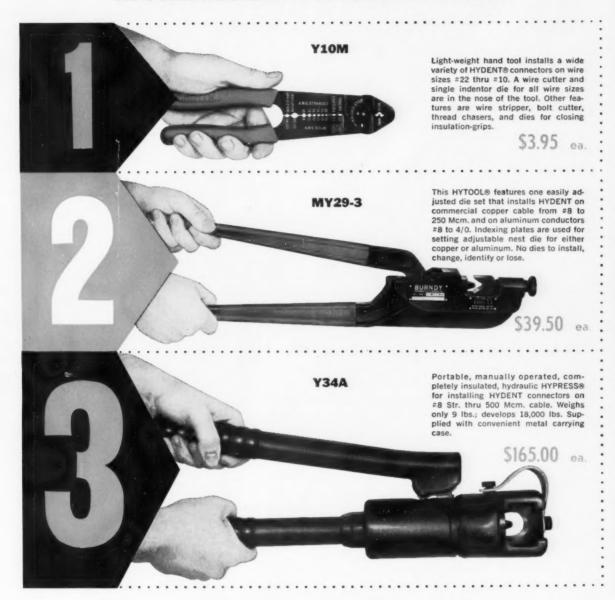


data on the comple	te line.	
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Company		
Address		
City	State	



# GET THE BIG 3

#### IN COMPRESSION-CONNECTOR TOOLING



Contractors with an eye on cutting connector installation time count on the Burndy Big 3. This Y10M, MY29-3, Y34A combination crimps practically every type and size compression connector on any job...adds the versatility, speed, and economy that result in profitable jobs. See your local Burndy distributor for demonstration.

Norwalk, Connect.

In Europe: Malines, Belgium

Toronto, Canada

# in this day of Prismatic Light Control

Art Metal
introduces a new line of
Aluminum Recessed
and Surface Rounds
with Regressed Prismatic
Amcolenses\*

The prismatic Amcolenses are regressed above the ceiling to lessen glare and provide an architecturally pleasing ceiling surface. Housing and exposed fronts are made of aluminum for ultimate dependability, indoors and outdoors, particularly in coastal areas. Write for Bulletin RR1-961.

\*Also available with white Amtex glass diffusers.

WAKEFIELD CORPORATION ELECTRICAL PRODUCTS GROUP

Art Metal Lighting Division — Cleveland 3, Ohio
1814 East 40th St.

Wakefield Lighting Limited — London, Ontario

Wakefield Lighting Division – Vermilion, Ohio Sta-Warm Electric Company – Ravenna, Ohio

# Yours FREE: Fact-filled bulletins—selector guides, samples ... USE CARD ON INSIDE BACK FLAP!

Phelps Dodge TUFPLY Portable Cable For Maximum Flexibility and Resistance to Abrasion



Used and proven in Phelps Dodge's own mining operations for years, this cable assures you the maximum in protection in locations which are subjected to mechanical and electrical hazards. P-114-BM listing where required.

For information and specifications on the full line of Phelps Dodge cables, circle number 4 on the Graybar postcard.

PHELPS DODGE COPPER PRODUCTS CORP.

Cut Installation Costs with REYNOLDS ALUMINUM Rigid Conduit!

Reynolds Aluminum Conduit weighs only  $\frac{1}{2}$  as much as steel. It can be handled and installed easily, is easy to cut and thread.



Our illustrated brochure shows the complete range of sizes, and offers many hints on using this time-and-money saving conduit. For your free copy, just circle number 5 on the Graybar postcard.

REYNOLDS METALS COMPANY

THE SAW THAT

COULD CUT A

HOUSE IN

HALF!

The new Black & Decker Sabre Saw power-cuts clean through wood and plaster, metal pipe and sheet . . . with exclusive long-stroke action. Unique rock 'n' lock shoe design makes your work easier yet. Blade spindle turns 90° and 180° to cut in any corner, cut out any pocket. The Sabre Saw vibration is the lowest ever . . . its balance perfect. Wider range of blades for all-purpose performance. Circle number 6 on the Graybar postcard.

THE BLACK & DECKER MFG. COMPANY

## Fast Installation

SERIES **ÖÖ** FLOOR BOXES

The simplified assembly of '88' Series Floor Boxes assures fast installation, true leveling and quick access to wiring —at low cost.





'88' Series boxes are packaged with metal protective cap in place. Simply reverse the assembled top and install box.

For more information, circle number 7 on the Graybar postcard.

STEEL CITY ELECTRIC COMPANY



#### AUTOMATIC CABLE TAKE-UP REELITES BY APPLETON

A newly designed weatherproof and explosionproof reelite for industrial use incorporating a host of new features has been marketed by Appleton Electric Company.

This new model reelite, called the "RL" Reelite series, features one piece lightweight uni-cast main frame for perfect alignment, snap-on or threaded collector ring and spring housing covers doing away with screws and allowing release in seconds.

An exclusive self-contained safety spring cartridge permits practically instant spring replacement, if required, For full details on this new series of weatherproof and explosion-proof reelites, get Appleton Bulletin No. 505. Circle number 8 on Gravbar postcard.

APPLETON ELECTRIC COMPANY

#### HEALTHFUL COMFORT... Wesix Automatic Ionix Portables:

- · Filter out excessive positive ions
- Destroy airborne bacteria
- Easy to reach thermostat
- Guaranteed 10 years against element burnout

For completely automatic electric heating in one or more rooms or for general auxiliary heating. Wesix lonix unit keeps the air fresh as well as pure and germ-free. It is easily cleaned and safe for children.

For more information on Wesix products please send for free literature. Simply circle number 9 on the Graybar postcard.



NEW rigid geared threaders save time—cut costs—on all large threading jobs—3 big advantages:



- 1. Only one set of high speed dies needed to thread  $2\frac{1}{2}$ ,  $3^{**}$ ,  $3^{**}$ ,  $3^{**}$ , and  $4^{**}$  pipe and conduit. Die size selector plate sets quickly to size—easy adjustment for straight, tapered, over or understand threads.
- 2. Jam Proof for safe power threading Drive pinion kicks out automatically.
- 3. New Fast Action Cam-Type Workholder sets to size by turn of collar. Set screw holds work centered for perfect threads every time.
- For information, circle number 10 on Graybar postcard.

RIDGE TOOL COMPANY



#### MAKE GRAYBAR YOUR ON

# Only from BURNDY... all three types of Connectors:

THERMOWELD®—A permanent, welded electrical connection. Self contained, it's quick, easy, economical to use.

COMPRESSION — Available in many types and sizes, HYLUG® is short barreled for tight spaces. Only one indent required.

BOLTED — OKLIP® for high strength, easy application. Rubber-like rings capture and hold bolts for permanence.

Type KVS

Type YA-I

Type CSI

For our Industrial Pocket Catalog with complete code information, simply circle number 11 on the Graybar postcard.

BURNDY CORPORATION



Four Conduit Pipe Sizes 4 H42200-2" H42250-2½" H42300-3" H42400-4"



Base with 3-pole 110v receptacle cover

Base with two, 3-pole receptacle covers: 110v at front: 208v in back

#### Specify the Original HOPE GALVANIZED MALLEABLE IRON POLE BASE

Attractive, rugged lighting poles easily fabricated by combining HOPE threaded Bases with standard galvanized conduit. Four Base sizes permit your fixture and elevation selection for a limitless variety of installations. Tapped deep for strong, locking engagement with pipe thread. Ample chamber for conduit stubs, splicing, grounding. For complete Bulletin G-25, circle number 12 on the Graybar postcard.

HOPE ELECTRICAL PRODUCTS CO.



O.Z. terminating, sealing and splicing fittings will adequately and properly handle all your installation needs when using any of the available types of jacketed and nonjacketed armored cables. These fittings guarantee the user

thorough protection under all conditions when properly selected.

For complete information, circle number 13 on the Graybar postcard.

O.Z. ELECTRICAL MFG. CO., INC.

## BELL BOXES ... Moistureproof! For Outdoor, Indoor Use



One-gang box available with 3 to 5 openings; two-gang, 3 to 7—in both ½" and ¾" reinforced, internal threaded hubs. Use with Bell Weatherproof outlets, switches, or as junction box. Universal type fits most standard covers, devices. Rugged, die-cast, corrosion-resistant, U.L. Approved.

Circle number 14 on the Graybar postcard.

**BELL ELECTRIC COMPANY** 

#### For low-cost installation and dependable operation, specify FEDERAL "Vibratone" Horns!



Here's a line of compact, powerful and self-adjusting electric horns that provide for the simplest installation imaginable. They mount in standard 4" square outlet boxes, either surface or plastered-in. Unit extends just 1½" beyond box. Includes volume control to adjust from a whisper to a 100 decibels. Modular accessories available provide 6 mounting variations for the 3 different models. Choice of AC or DC and wide-voltage varieties.

varieties.

The complete line, along with dimensional and other data, will be at your fingertips if you write for our new Bulletin Number 105. Circle number 15 on the Graybar Destrand

FEDERAL SIGN & SIGNAL CORPORATION

#### NEW...GROUNDING DEVICE SAVES TIME, UPKEEP, EXPENSE



Benjamin has an extensive line of Grounding Reels and Electric Extension Cord Reels. For helpful data, circle number 16 on the Graybar postcard.

Model 300-3-FN

BENJAMIN REEL PRODUCTS, INC.

#### BRADY KEEPS YOUR NAME ON THE JOB



W. H. BRADY CO.

Card mounted, self-sticking nameplates stay on the job long after you complete it. They're "silent salesmen" that tell your customer to call you for future service. Brady nameplates are made of metallic aluminum foil or colorful vinyl plastic. They come on handy Blue Streak Dispenser Cards. Easy to carry—easy to apply. Just peel back Zip-Strip, remove nameplate, press on clean, dry surface. Sticks permanently. Choice of aluminum foil or all-vinyl materials.

Cost? Little as 2c each.

Send for bulletin and free sample. Circle number 17 on the Graybar postcard.

# NE-STOP SHOPPING CENTER FOR

# Speed framing and suspension work with GLOBE Channel and Fittings!

Globe Channel and Fittings can be used for any framing or suspension purpose. Set-up with a hacksaw and wrench, Globe Channels are com-pletely re-usable, can be unlocked and set-up again in another location. Triple grip lock nuts are furnished for greater strength and there is a fitting for any purpose. Fluorescent fixture hanger fittings, porcelain cable clamps, concrete inserts, pipe clamps, shelf brack-ets, beam clamps and flat plate fittings, as well as custom engineered fittings and accessories are available to suit every need.

For information and literature

showing complete range of fittings and accessories, simply circle number 18 on the Graybar postcard.

THE GLOBE COMPANY



# NOW! LOOK HOW MUCH YOU SAVE BY SWITCHING FROM COPPER TO ALUMINUM SE-U!

At today's prices, aluminum SE-U saves you money over copper right down the line!

Cost of braided #2 aluminum SE-U is 35% lower than #3 copper SE-U. Check the table below for cost comparison. (Neoprene jacketed aluminum cables offer similar savings.)

> Service Entrance Cable, Braided Full Neutral, Type SE, Style U

SERVICE	ALUMINUM		COP	PER	SAVINGS		
Amperes	Size AWG	Cost M'	Size AWG	Cost M'	\$	%	
100 150 200	2 2/0 4/0	303 520 704	3 1/0 3/0	465 1083 1590	162 563 886	35 52 56	

Send for a free copy of "K/W Service Entrance Cable." Just circle number 19 on the Graybar postcard.

KAISER ALUMINUM & CHEMICAL SALES, INC.

## INTERMATIC Time Controls for faster installation and greater reliability!



For reliable Time Controls, specify INTERMATIC, the unit that gives you all these time and money-saving features:

- 40-Amp rating—4,375 Watts Tungsten
   Snap-out mechanism for fast, easy mounting
- E-Z See Dial for rapid and accurate settings
   Front-Mounted motor to quickly check operation without removing entire mechanism

 31 cubic inches wiring space prevents cramped and skinned fingers There's an Intermatic Time Control for nearly every timing need. Get your free catalog showing models, specifications, etc. — circle number 20 on the Graybar postcard.

INTERNATIONAL REGISTER COMPANY

#### SAVE DOLLARS, HOURS!

M



Special Model K-15 for telephone installers available, too.



For details, circle number 21 on the Graybar postcard.

RAMSET FASTENING SYSTEM





For maximum current carrying and load interrupting characteristics . . . BOLT-LOC® PRESSURE CONTACT LOAD BREAK SWITCHES

Here's a line of pressure contact load break switches for service entrance, feeder and industrial use that far exceeds maximum operational and safety requirements. Will interrupt extremely high short circuit currents when equipped with current limiting fuses. Furnished standard with quick-break mechanism, replaceable arcing tips, and double slot steel plate arc quenchers. For 1200 to 4000 amperes, 240 and 600 volts. Avail-

able unmounted or in free-standing or wallmounted NEMA 1 enclosures; also, dust-tight and outdoor enclosures.

Our BOLT-LOC Bulletin Number 101 describes the complete line and illustrates all the built-in advantages of these unsurpassed switches. For your copy, circle number 22 on the Graybar postcard.

BARKELEW ELECTRIC MFG. CO.

## NEW! Emerson Electric Fan Forced Heater



ic

cle

Instant high capacity air heating . fan circulates heat throughout the room . . . built-in thermostat provides controlled comfort level . . . no ductwork required.

For information on Emerson Electric . . the most complete line of residential and commercial equipment . . circle number 23 on the Graybar postcard.

**EMERSON ELECTRIC** 

# NEW BATTERY SYSTEMS for . . . Flashlights, Instruments and Portable Electronic Equipment

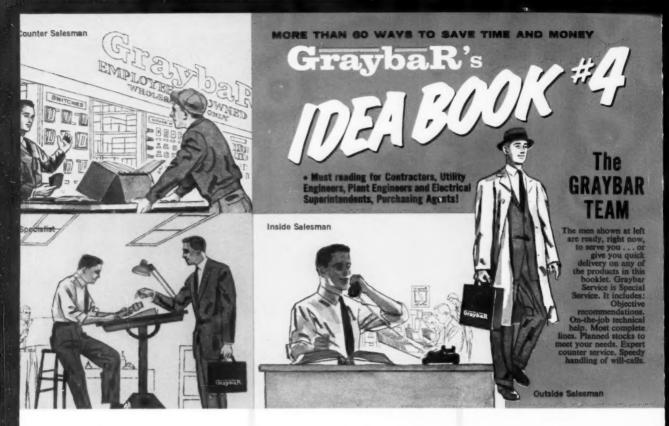
#### Mallory Mercury Batteries Mallory Manganese Alkaline Batteries

- · Long Service Life
- · Long Shelf Life
- · More Sound Power
- · Never Leak

Circle number 24 on the Graybar

**MALLORY BATTERY COMPANY** 





## Fast, Temporary Conversion to 3-Wire GROUNDING SAFETY



Cat. No. 5291 Duplex Adapter also available in ivorine

Plug-in adapter converts 2-wire duplex receptacles to temporary 3-wire grounding receptacles. Nothing in existing system has to be removed except receptacle cover plate screw to make room for captive screw in each adapter. Captive screw acts as grounding conductor. Green binding screw permits connection of independent ground wire in ungrounded systems. Operates in any parallel or T-slot duplex receptacle with metal or plastic cover plates. Circle number 1 on the Graybar postcard.

HARVEY HUBBELL, INC.

## NATIONAL ELECTRIC SURFACE WIRING SYSTEMS

a complete line of raceways for flexible, low-cost wiring "on-the-surface"



ECONOMICAL—low initial investment compared to other raceway wiring systems... meets all installation requirements with a minimum number of fittings.

TIME SAVING—
"Lay-in" design (no fishing) helps keep your installation costs low, profits high.



FLEXIBLE—surface mounting and twopiece "lay-in" design of NE Raceways mean instant accessibility to meet changing electrical needs.

MODERN—streamlined contour and attractive finish blend with both old or new interiors.



DURABLE—rugged, heavy-duty construction gives lasting strength, safety and service life.

Circle number 2 on the Graybar postcard.

NATIONAL ELECTRIC DIVISION H. K. PORTER COMPANY, INC.



Because of the many appliances now found in the average home—and the consequent high voltage requirements —Triangle EMT is now finding wide residential usage. It eliminates the possibility of children making contact with these higher voltage conductors with pins, knives and the like.

pins, knives and the line.

Triangle EMT is built to last, too. It's electro-galvanized on the outside with a 99.9% pure zinc coating and silver finished inside to give maximum protection against corrosion. Uniform ductility is assured in every foot of thin-wall coating by the exclusive Triangle welding process . which means smooth, accurate bends without kinking.

For a safer home . . . and a more efficient one . . . recommend Triangle EMT on all residential jobs. For more information, circle Graybar postcard number 3.

TRIANGLE CONDUIT & CABLE CO., INC.

# EVERYTHING ELECTRICAL! TO GRANTING





**NEW from BERNZ-O-MATIC** 

Famous Propane Torch With Extra Fuel Cylinder Attached

Here's the tool for doing hundreds of maintenance, repair and construction jobs with an extra fuel cylinder to give you up to 30 hours burning time. Lets you do jobs easier and faster, with long lasting fuel supply.

For descriptive literature, circle number 25 on the Graybar postcard.

OTTO BERNZ CO., INC.





#### TUFFLINE CONTRACTOR'S PORTABLE POWER DISTRIBUTION SYSTEMS

Handy ... Dependable ... Safe

Easily Stored

Safety Engineered

Easily Connected

- UL Approved Components Extensions Available
- 3 Pole System
- Dynaprene Cord
- Neoprene Molded
- Connectors
- Waterproof

to Power For descriptive bulletin, check number 26 on

the Graybar postcard.

WHITNEY BLAKE COMPANY



# A RED HOT ANSWER FOR A RED HOT PROBLEM!

Collyer Silicone Power Cables are designed to operate continuously with conductor or ambient temperatures of 150°C and will withstand intermittent rises to 200°C.

The outstanding heat resistance of these cables gives them:

Dependability and long life in hot locations whether dry or moist.

Very high current carrying capacity.

Get full details-check number 27 on the Graybar postcard.

COLLYER INSULATED WIRE CO.

The Safety Switch That Challenges Comparison...

BULLDOG'S General Duty

Safety Switch Minimum Arcing Double Break Switching

Arc Control Vacu-Break Principle

Pressure Contacts
Clampmatic Spring Action
Positive Switching
Direct Handle Operation

PLUS . . . All Current Carrying Parts Are Silvered

Available in NEMA 1 and NEMA 3R Enclosures . . . Competitively Priced. For complete information, circle number 28 on the Graybar



I-T-E CIRCUIT BREAKER COMPANY BULLDOG ELECTRIC PRODUCTS DIVISION



Perfect inexpensive companion installation for automatic time control of:

Space Heaters Attic & Bathroom Fans Garage & Outdoor Lights Evaporative Coolers

For use in Homes, Motels, Schools, Industrial Plants. Variety of Timings available
—mounts in any standard wall box.

Circle number 29 on the Graybar postcard for complete information.

M. H. RHODES, INC.

PHILLIPS RED HEADS Cut Construction and Maintenance Costs

-Install easier. Hold with certainty

Phillips RED HEAD self-drilling concrete anchors offer the easiest, most economical and most reliable way to anchor any kind of electrical equipment . . . motors, power equipment, heavy conduit, cable trays, junction boxes, or what have you . . . to any concrete surface. RED HEADS are rapidly installed with any make or model impact hammer . . . and their wide margin of holding power makes them proof against severe vibrational loads. Look to RED HEADS if you wish to install with CERTAINTY.

For free technical literature, simply circle number 30 on the Graybar postcard.

PHILLIPS DRILL COMPANY

BABCOCK

Is the Ladder you are looking for

Good, strong durable Ladders of Top Quality

Moderate in price and long on service



**ELECTRICIANS** demand these superb Ladders. The best ever made. For free literature, circle number 31 on the Graybar postcard.

W. W. BABCOCK CO., INC.



# REMEMBER

# Graybar service includes: Objective recommendations. On-the-job technical help. Most complete lines.



# LUMINATOR UL Approved Heat and Light Infrared Fixtures for Indoors and Outdoors

Luminator T3 Infrared one and two lamp fixtures are available in three reflector shapes, sizes 500 to 7600 Watts. They give 50% more radiant heat than quartz tube or metal sheath units with 8 lumens of light per watt... light and heat building interiors and outdoor areas. For Design Manual, circle number 32 on the Graybar rosstead.

LUMINATOR, INC.



# PRESTIGE PRODUCTS AT COMPETITIVE PRICES

With a sincere desire to better serve industrial users, Ray-O-Vac introduces the WORKMAN family of lighting batteries.

- Available in size "D" (WM10), size "AA" (WM40), size 6 (WM50) and 6 volt lantern battery (WM20).
- Specifically designed for industrial application.
- Write today for complete catalog. Circle number 33 on the Graybar postcard.

RAY-O-VAC COMPANY

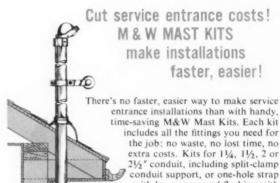
# Low-Cost Leviton Hi-Lo Light Control Adds "Decorator-Lighting" in Seconds

This new two-stage dimming device replaces any standard single-pole switch, requires only two simple connections. It is designed with an integral wall plate. Brings a touch of luxury to any room in a home; ideal for numerous commercial applica-



tions. Rugged and efficient, it will outlast ordinary switches, saves current and extends lamp life when used in "Lo." Best of all it is inexpensive. Listed by Underwriters' Laboratories. Circle number 34 on the Graybar postcard for complete information.

LEVITON MANUFACTURING CO., INC.



with lag screws, and flashing with adjustable seal. You save, too, because kits cost less than individual fittings. Look to M&W, too, for a complete line of service entrance fittings. Complete literature showing the wide selection of all M&W fittings is available on request. For your copy, circle number 35 on the Graybar postcard.

THE M. & W. ELECTRIC MFG. CO., INC.

#### MINERALLAC "MINNY-TWIST" CONDUIT HANGERS save time, trouble and temper. Can be installed in just three easy steps.

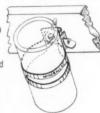
No Protruding Ears or Bolts with "MINNY-TWIST" CONDUIT HANGERS. 1. Install
Hanger with
Screw or Bolt.
Convenient slot
for Screwdriver.



2. Hang Conduit in Hanger. No Wrestling with Nuts, Bolts or Tools.



3. Insert
Tongue in
Slot. Twist
Tongue with
Tool supplied
in each
Standard
Package.



MINERALLAC ELECTRIC COMPANY





# Now! Everything You Need To Fasten To Any Kind of Masonry... In One Handy Package!

New Rawl Contractor's Kit puts the drills, anchors and screws, in the sizes you need, on the job where you need them. And all in a sturdy reusable hinged box. Each kit contains: 100 Genuine Rawlplugs, 100 Pan-Head Screws, 1 Carbide Drill.

Contractor's Kits save time and trouble. They're ideal for tool boxes. Come in three popular electrical sizes: #8, #10, #12. For more information, circle number 37 on the Graybar postcard.

THE RAWLPLUG COMPANY, INC.

# Planned stocks to meet your needs. Expert counter service. Speedy handling of will-calls.







Would you like to make your metal cut-off jobs easier and more efficient . . . be able to cut conduit, pipe, angles, slots, notches and bevels on the same machine at the job site? If so, check the New Model 300 Wells Metal Cutting Band Saw. It does all this—and more. Just look at these value features:

- Capacity: 31/2" x 6" (3" pipe)
- · Selective Speeds: 54, 100, 190 F.P.M.
- · Gravity Feed and Automatic Shut-off
- Rigid Construction, Well Guarded
- Dual Purpose—Horizontal and Vertical
   Optional Wheels and Handle for Complete Mobility
- For information on the New Model 300 Wells Metal Cutting Band Saw, circle number

38 on the Graybar postcard.

WELLS MANUFACTURING CORPORATION



# NOW . . . The "trim look" in water

# coolers—the new OASIS ON-A-WALL



for trouble-free performance. Full 5-year warranty. For Bulletin 1162, including prices, circle number 39 on the Graybar postcard.

THE EBCO MANUFACTURING COMPANY

# For High Temperature Wiring... Use ROCKBESTOS Silicone Rubber Wires and Cables



Rockbestos silicone rubber power cable, control cable, apparatus and motor lead wire, appliance and fixture wire and lighting wire offer these outstanding advantages:

- excellent heat resistance—125°C-200°C
- · flame resistance
- · corona and ozone resistance
- maintains flexibility from -130°F to -500°F
- excellent resistance to oil, solvents, fuels and chemicals
- · and excellent electrical properties

For more information, send for the new Rockbestos Silicone Rubber Wire and Cable Selector. Simply <u>circle number</u> 40 on the Graybar postcard.

ROCKBESTOS

#### Jefferson DRY TYPE TRANSFORMERS



Jefferson's General Mounting dry types can be installed on floor, wall, ceiling—wherever it's most convenient. Large wiring compartments make for fast, easy installation. The rubbercushioned core and coil provides quiet, efficient service. Single phase models to 100 KVA; three phase to 300 KVA.

Circle number 41 on the Graybar postcard for descriptive literature.

JEFFERSON ELECTRIC COMPANY

T-P ELECTRIC gives you Three-Phase Advantages on Single-Phase Lines!



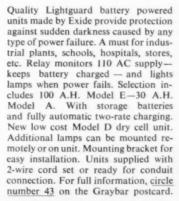
Incorporate a T-P Phasing Unit with a three-phase motor and a standard fusible motor control and:

- Reduce initial and maintenance
  costs:
- Reduce starting surge on power line;
- · Improve power factor;
- Eliminate need for heavy, expensive single-phase motors (Detach phasing unit when 3-phase service becomes available).

Choose from three models to fit any application. For complete information on all models, simply circle number 42 on the Graybar postcard.

T-P ELECTRIC & MFG. CORP.

# low cost emergency lighting protection EXIDE LIGHTGUARD



EXIDE INDUSTRIAL MARKETING DIVISION
The Electric Storage Battery Co.







# To obtain helpful literature on any or all products described in

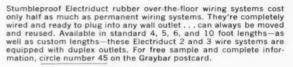
EIGHT BALL BEARINGS IN AN ELECTRIC DRILL!

If you picked one reason why the Thor 1/2" Silver Line Electric Drill is the best for industrial-type service, it could be its exclusive eight-ball-bearing construc-tion. Add the triple insulated, Thor-built armature, precision hobbed steel gears, over-size switch...they all represent highest quality and heavy duty performance that can't be beat!

For complete information check number 44 on the Graybar postcard

THOR POWER TOOL COMPANY

# Save Money with ELECTRIDUCT Rubber over-the-floor wiring systems



ELECTRIDUCT DIVISION IDEAS, INC.

## New LINE-FLEX®

... the simpler, extremely versatile Cable Suspension System!



#### CHECK THESE ADVANTAGES

- No Installation Equipment Needed!
- Saves Time, Cuts Labor Costs!
   Designed for Flexible OR Rigid Use!
- · Outperforms Old-Fashioned Methods!

Unique, lightweight LINE-FLEX offers obstacle-avoiding flexibility in one plane and non-sag rigidity in the other! Requiring no specia equipment, tools or training to install, it can be used in non-supported rigid lengths of up to 14 ft. or in catenary applications of up to 400 ft. INSTALLS IN UP TO 25% LESS TIME! Several hundred feet of cable may be pulled through up to three 90° bends by a 2-man crew without damage or distortion.

Available in 2, 3 & 4'-dia. Galvaneal or Stainless Steel with full line of fittings, and accessories. FOR FREE CATALOG CIRCLE of fittings, and accessories. FOR FREE ONUMBER 46 ON GRAYBAR POSTCARD

LINE-FLEX DIVISION OF PERFECT-LINE MFG. CORP.

## YOU GET MORE HOLES PER DOLLAR WITH PRECISION DRILLS AND TAPS



#### Specify PRECISION for:

- Faster, cleaner cutting for drilling and tapping holes in all kinds of materials
- · Highest quality
- · Precision taps and drills made in America by Americans

For information, circle Graybar postcard number 47

PRECISION TWIST DRILL & MACHINE COMPANY

#### GUARANTEED

# 945

#### MAINTENANCE FREE SERVICE

PRoTEX Industrial Duty Electric Cord Reels provide out-of-the-way storage for drop cord lighting equipment.

Reels feature ease of installation, mainte-nance free operation. Automatic lock for positive stop at desired point. Ten year Warranty of material and work-manship guarantees service plus!

Two sizes offered, equipped with two conductor or three conductor grounded cord.

Circle number 48 on the Graybar postcard.

DANIEL WOODHEAD COMPANY

# Big Savings With TRUCO **Power Handsaw** Abrasive Blades



Truco TruBond Break-resistant Abrasive Blades cut everything from toughest concrete to lightest, insulating brick. Ideal for any job where only a handsaw can be used. And, for many jobs, a handsaw with a TruBond Blade can make it unnecessary to invest in higher-priced equipment. Sizes from 6" to 12" in either 1/8" or 1/4" thickness. For literature, circle number 49 on the Graybar postcard.

WHEEL TRUEING TOOL COMPANY

# PORTABLE POWER WHEREVER YOU NEED IT "TOLEDO 68" IS THE HANDIEST TOOL TO OWN

Consists of worm and gear assembly powered by reversible ½ hp motor. Strong, rugged, lightweight frame. Adaptors, optional, lightweight frame. Adaptors, optional convert it for many jobs. Takes die stocks up to 4". Equipped with square socket adaptors it will do cranking, turning large valves, lifts and hoists. It weighs only 33 lbs. Can be equipped also with air motor, if desired. Circle number 50 on the Graybar postcard.

THE TOLEDO PIPE THREADING MACHINE CO.



At Last! One Multi-Purpose Model 7 Day Calendar Dial Time Control . . . Paragon 7000 Series

#### Relay designed 4-pole switch offering pole-double throw action

The newest and latest in automatic timing on a weekly schedule . . . Paragon 7000 series 7 day

calendar dial time controls with individual daily settings that distinctly separate day and night periods. It allows you to turn any electrically controlled system on and off automatically at different hours of each day and any day or days can be omitted entirely. Ideal for use in schools public buildings, stores, factories and offices.

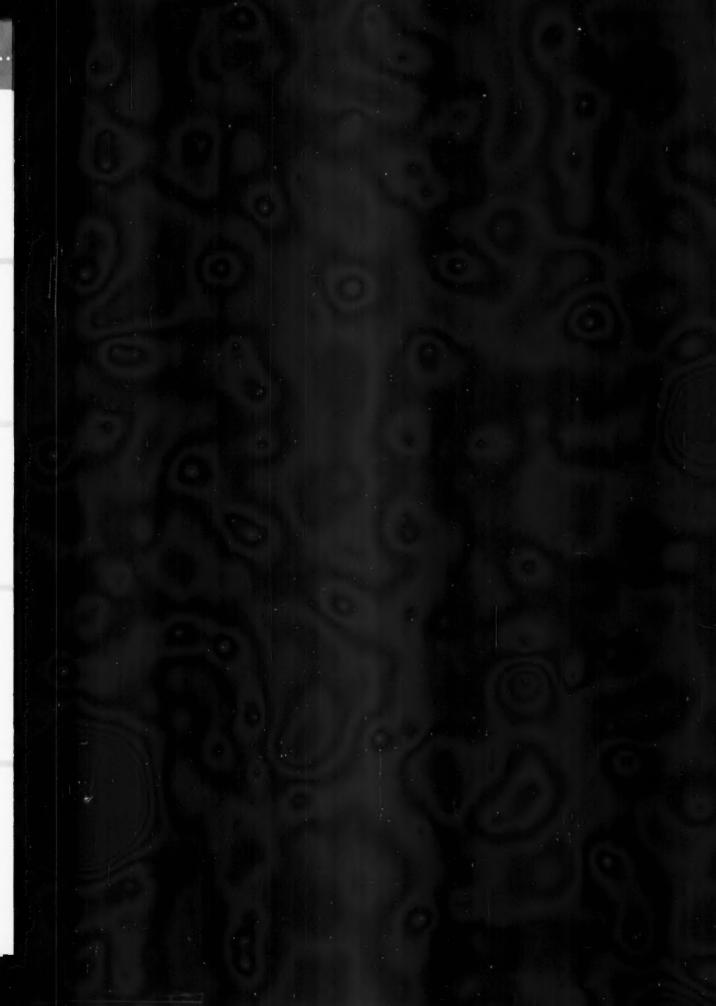
News t features include:
 4-pole design with each pole completely isolated ... 2 poles are in the open position and 2 in the closed.
 40 amperes capacity ... largest load carrying-capacity of any 7 day in a control.

carrying capacity of any 7 day time control.

Easy to install.

For information, simply circle number 51 on the Graybar postcard.

PARAGON ELECTRIC COMPANY



# "IDEA" BOOK circle appropriate numbers

# NOW — AUXILIARY LIGHTING PROTECTION AT A PRICE YOU CAN AFFORD!

# 2-75 BIG BEAM
"LIFE SAVER"
WILL DO THE JOB
ECONOMICALLY—
DEPENDABLY

7½-V Dry Cell Battery Five Continuous Burning Hours Volt Meter • Two Swivel Heads Neon Light • Wall Mounting Bracket



Neon Light • Wall Mounting Bracket #2-75 "Life Saver"
For more information, circle number 52 on the Graybar postcard.

U-C-LITE MANUFACTURING COMPANY

# White Wiring Devices ... a Bryant First

Today's m

Today's modern architecture demands products that offer both quality performance and complimentary appearance. The wide variety of Bryant Wiring Devices...in sparkling white . . answers this need for fine products in today's most popular color choice . . pure white. Bryant White Devices are available in Fashion Plate Switches, A-C Switches, Mercury Switches, and in regular duplex and grounding receptacles and both "Uniline" and the new 'Smooth Line" wall plates. plus the complete line of BECO devices and wall plates.

Send for descriptive literature. Just check number 54 on the Graybar postcard.

**BRYANT ELECTRIC COMPANY** 

# AMPROBE INSTRUMENTS SAVE



AMPROBE. Rotary Scale Models. Pocketsize Amprobe rotary-scale models measure amps and volts quickly, accurately (RS-3 also measures resistance). No need to interrupt service or cut conductors. Rotary scale for faster readings. Lock "freezes" pointer at reading. Advanced printed circuitry laughs at rough handling. Advanced movement design—new internal core magnet with self-shielding characteristics.



CABLE TRACER. Now you can trace conductors 10 times faster than ever before and leave your helper free to finish other jobs quickly and profitably! Search—and unmistakably identify—up to ten separate circuits simultaneously, even in the dark and when color coding is absent or obscured by age and dirt. A pocket-size tracing system in itself, Cable Tracer also tests for opens and shorts. Circle number 56 on the Graybar postcard.

AMPROBE INSTRUMENT CORPORATION

# ers on FREE Information Cards below.

#### Feed machine tools without rigid conduit...with PWC Bus Drop Cable

Now you can provide flexible branch circuit runs between overhead bus feeders and electrically powered machine tools and equipment, with PWC Bus Topo Cables. Especially avaluable for machine shops that must align machinery to fit varied production jobs. May be installed from a bus attachment or feeder raceway to the machine control bus standard fittings may be used. PWC Cable is highly resistant to damage by lubricants, cooling oils, impact and abrasion. Available in sizes from #14 to #2 AWG, with three insulated conductors and three grounding conductors

For data sheets giving full description of PWC Bus Drop Cable (sizes, diameters, stranding, etc.) and accessories, simply circle number 53 on the Graybar postcard.

PLASTIC WIRE & CABLE CORPORATION





For fast. economical joining of fusable plastic pipe and conduit

NO SKILLED LABOR NEEDED! Butt fusion is the strongest, quickest and most economical method of joining plastic pipe and conduit. Oster's new FUSION TOOL now makes fusion joining a simple matter. It speeds up all installations. Compact, and very light in weight, this unique, NEW, Oster Tool can be used practically any place-to complete a uniform, fused joint in seconds!

Circle number 55 on Graybar postcard for fully illustrated brochure with complete information and prices.

THE OSTER MANUFACTURING COMPANY

# DIAMOND PLASTIC SCREW ANCHORS





**Engineered & Priced Right** for Low-Cost Installations

Designed with effective anti-turning ribs, plus flat, concentric ribs for maximum holding power. Open throat permits easy insertion of wood or sheet metal screws.

FREE CHART-GUIDE TO FASTENER SELECTION Send for this handy guide today. Simply circle number 57 on the Graybar postcard.

DIAMOND EXPANSION BOLT CO., INC.



# NUTONE SURFACE MOUNTED RADIANT HEATER



It's so easy to install NuTone's Model 9290 Radiant Heater! Use it for new construction and for replacement of a standard ceiling fixture in remodeling. It mounts easily to standard 3" or 4" outlet box—provides even heat all the way to the bathroom floor! Thermal-protected heating element prevents over-heating. All exposed parts are Anodized Aluminum—won't rust, stain or corrode.

A NuTone color catalog describes all the NuTone door chimes, exhaust fans, range hoods, etc. To get yours, simply circle number 58 on the Graybar postcard.

NUTONE, INCORPORATED

#### BRANCH OFFICES

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For your free copy of the literature you need, circle the numbers



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# Whatever your electrical needs-plenty of everyday supplies, or hard-to-find specialized equipment—the best answer is to call Graybar



## C-L-X SEALED CABLE SYSTEMS PROVIDE UNMATCHED ECONOMY!

sheaths of steel, copper, aluminum or bronze



Available with C-L-X continuous corrugated, metallic, sheathed cable steel, copper, advantages and economy. Highly resistant to all types of mechanical and chemical damage, and completely impervious to liquids and gases, they eliminate most of the costly and time consuming work involved in conventional installations

> Get free catalog #1043. Circle number 59 on the Graybar postcard

> > SIMPLEX WIRE & CABLE COMPANY



## SEND FOR FREE BOOKLET

Newest specifications on Sealtite®

Latest Bulletin No. S-544 on Sealtite, the original flexible liquid-tight wiring conduit by Anaconda. Specifications include diameters, bend diameters, shipping weights on all four types of Sealtite (U.A.—E.F. on an rour types of Seattre (U.A.—E.F. H.C.—C.S.A.), also latest packaging. In-cluded is information on another Anaconda product, Type DSL conduit. Circle number 60 on the Graybar

> ANACONDA METAL HOSE DIVISION ANACONDA AMERICAN BRASS COMPANY

# Specify MARATHON for Dependable Dry Batteries

MARATHON offers a complete line of batteries for your portable power requirements.

For more information, circle number 61 on the Graybar

HIGHEST QUALITY-FAMOUS FOR ENDURANCE.

**MARATHON BATTERY COMPANY** 



Industrial Flashlight



#49NI Exclusive patented No Leak Lantern



#896



## ILG Heaters For Quick Automatic Heat

problems is found in the 14 ILG models with heating capacities from 11/2 KW to 36 KW.

They're easily installed-just mount and connect to electric circuit-and can be operated by both manual and automatic control. ILG Electric Heaters are ideal for full or auxiliary heat requirements-freeze prevention-isolated buildings-for fast clean, quiet heat anywhere.

ILG ELECTRIC VENTILATING CO.

#### Special ILG features Include:

- · Whisper-quiet fan air delivery
- · Black-heat elements protected by built-in thermal control
- · Totally enclosed motor permanently lubricated
- Individually adjustable discharge louvers
- · Suspension from ceiling or wall

Get your free copy of bulletin DB5-100 providing complete information. Simply circle number 62 on the Graybar postcard.

## NEW Jet Line JETMASTER makes it easier than ever to install pull lines in underground conduits in seconds



The famous Jet Line method of installing pull lines in underground conduits in seconds-regardless of bends, mud or water-by propelling a cone with carbon dioxide has been improved upon. Now the entire Jet Line method is combined into one handy, compact, easily portable unit . . . the Jetmaster. It makes you a one man gang for all conduit wiring jobs . . . includes everything you need to pull wire in any size, any type conduit from 1/2" to 4" ID. In distances up to 1500 feet, it eliminates rodding and shaking . . . saves time and money. Three pipe sealoffs included:  $\frac{1}{2}$ " thru 1";  $\frac{1}{2}$ " thru 2"; 2" thru 4".

For detailed information, circle number 63 on the Graybar post-

JET LINE PRODUCTS, INC.

#### MAKE THE GRAYBAR COUNTER

#### YOUR SHOPPING CENTER FOR EVERYTHING ELECTRICAL

Graybar is industry's one-stop source for everything electrical-from a simple wire nut to a complete packaged power and control cable system. A 100,000-item inventory, bearing the trademarks of America's best known manufacturers is available through more than 130 Graybar offices and warehouses located in every key U.S. industrial area.

CALL GRAYBAR FIRST FOR EVERYTHING ELECTRICAL







Get more for your money! Specify I-T-E! Only I-T-E gives you rugged panelboard-type construction in a residential product...a model for every application...plus separate packaging that reduces your out-of-pocket costs and speeds installation!

Use I-T-E Fusible Loadcenters and you can buy the box separately . . . rough-it-in, and add the interior and trim later as the job progresses. All Uni-Pak boxes have a standard

141/4" width and fit snugly between 16" stud centers. The box almost holds itself in place as you secure with nails or screws to study through quarter-inch knockouts. Get the whole story. Write I-T-E Circuit Breaker Company, Walker Division, 125 Bennett Street, N. W., Atlanta 9, Georgia. Ask for Bulletin 561.

New 1961 Speedfax Catalog just off the press!

Ask your I-T-E salesman for a new Speedfax catalog so you can have a handy quick reference to I-T-E products at your fingertips.

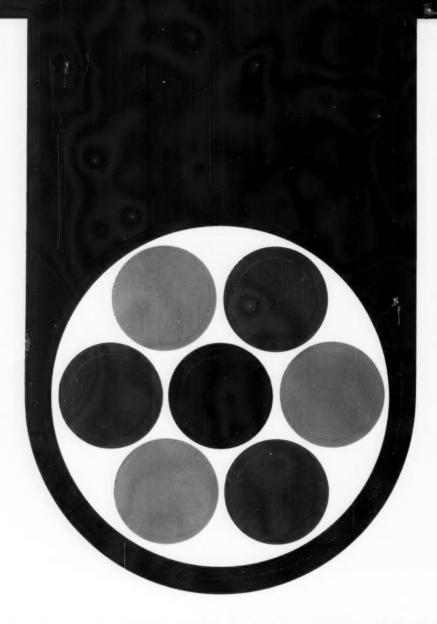




The HEART of HOUSEPOWER / NERVE-CENTER of the MEDALLION HOME



I-T-E CIRCUIT BREAKER COMPANY



# **NEW WAY TO EVALUATE CABLE!**

# "VALUE RATINGS" RELATE PERFORMANCE TO IPCEA OR COMPETITIVE STANDARDS

New Value Ratings tell at a glance the composite story of each Kaiser Wire construction—as it performed in as many as 25 specified tests. In each case a well-known standard serves as 100%:

For power cable, the Value Rating standard is all

SPECIFICATIO
OR NAME OF
PRODUCT

PERCENTAGE
COMPARISON
AGAINST
RECOGNIZED
STANDARD
AT 100%

SPECIFICATION
OR NAME OF PRODUCT

PERCENTAGE COMPARISON AGAINST RECOGMIZED AT 100%

PERCENTAGE COMPARISON STANDARD AT 100%

SPECIFICATION IPCEA test requirements for types of insulation and jacketing specified . . .

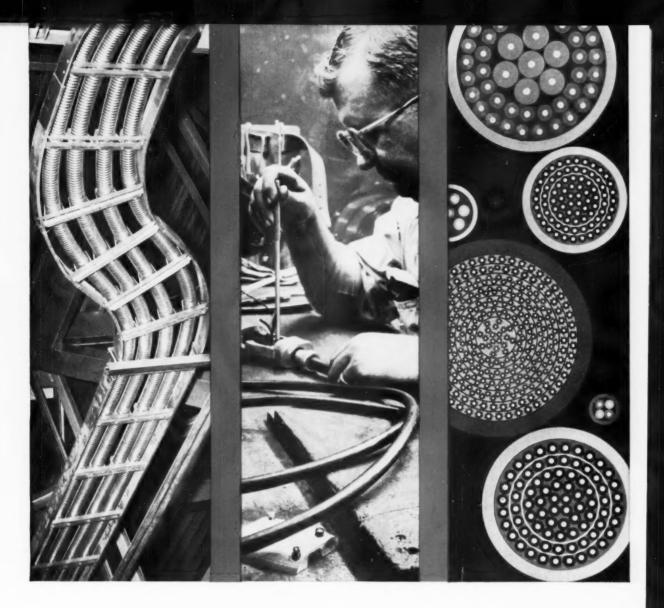
For portable cord, the standard is service-perdollar for the least expensive cord (C.V.) as proved by life-expectancy tests.

. . . For control cable, the standard is a composite of minimum requirements for eight important insulation qualities.

Compared to these standards, Kaiser Wire constructions earn Value Ratings as large as 767% – valid proof that the spark of quality is Kaiser Wire experience.

For details and Value Rating listings, ask your Kaiser Wire Distributor for free K/W Value Rating Bulletins, or write: Kaiser Wire, Room 844h, Kaiser Aluminum & Chemical Sales, Inc., Kaiser Center, 300 Lakeside Drive, Oakland 12, California.

KAISER ALUMINUM & CHEMICAL CORPORATION



# KAISER INTERLOCKED ARMOR CABLE DISTRIBUTES POWER AT LOWER COST

It needs no conduit for protection. It is flexible, forms easily. And because of its light weight, K/W Aluminum Interlocked Armor Cable cuts installation costs. One hundred feet of this aluminum-armored cable in unshielded 5KV. 3-cdr. size 1/0 AWG, weighs only

125 lbs. compared to 234 lbs. for size 2, copper-conductor steel-armored. K/W aluminum-armored is corrosion resistant...and its insulation has nearly 20 times the ozone resistance required by IPCEA.



#### KAISER PORTABLE CORD SAVES \$22.24 IN ONE TOOL'S REPAIRS

A typical case shows how K/W Master Laytex portable cord can save \$22.24 in maintenance—before a single repair. A new length of K/W Master Laytex cost the buyer \$4.65; plus an estimated \$6.00 labor to connect it. An equal length of "bargain"

cord (low-priced C.V.) cost \$2.89. But the latter was in and out for repairs five times—running up \$30.00 labor—before K/W Master Laytex failed once. The net saving was \$22.24 with K/W Master Laytex cord.



# KAISER CONTROL CABLES OFFER WIDEST CHOICE OF INSULATIONS

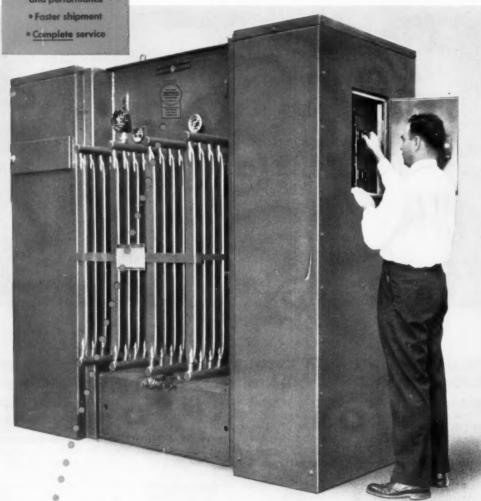
Kaiser Wire offers the following broad range of control cable insulations . . . Thermoplastics: Polyethylene, Polyvinyl Chloride. Synthetic rubber: Pyrosec® (SBR), Hydrosec® (SBR), Oil base, Kalzone® (butyl), Silicone. Natural rubber: Kaiser Laytex®, the pat-

ented liquid latex covering unequalled for strength and dielectric qualities. Add neoprene or plastic jacketing, copper or aluminum conductor—and you can choose from hundreds of K. W cables of extra value!





NOW... a wider



## SYMBOL OF FULL VALUE

With this seal, General Electric certifies full value for your transformer dollar; full value in terms of superior basic design, features, and performance... plus faster order handling and shipment... plus complete service before, during, and after installation. No other transformer manufacturer can match this <a href="complete">complete</a> General Electric package.

# choice of power packages

General Electric offers efficient, co-ordinated Integral Distribution Centers for every load application

Whatever your load requirements, General Electric offers an Integral Distribution Center that is just right for the job. Five incoming, three transforming, and five outgoing sections are available to provide a versatile line of power packages for any application. The result . . . a "customer-designed" combination saving you the cost of special design engineering.

And, since each Integral Distribution Center is shipped in a single, pre-wired package\*, instal-

lation costs are lower.

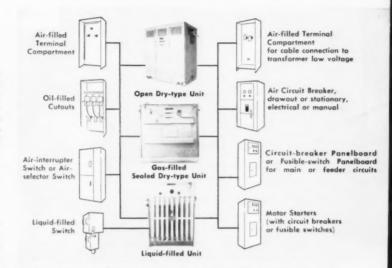
#### Choose from over 50 power packages

General Electric offers more than 50 distribution-center combinations . . . with ratings from  $112 \frac{1}{2}$  to 2500 kva. Here are the "building blocks" that make these combinations possible:

- Five high-voltage terminations: air switches with stored-energy mechanism (2 types), oil-filled cutouts, liquid-filled switches, or a full-length cable-termination compartment.
- Three transforming sections: liquid-filled (oil or Pyranol†, 112½-2500 kva), open dry-type, or gas-filled sealed dry-type (300-2500 kva).
- Five low-voltage terminations: AK circuit breaker, full-length terminal compartment, molded-case circuit-breaker panelboard, fusible disconnect-switch panelboard, motor starters.
- Optional features such as metering, relaying.
- Space-saving size: newly redesigned packages such as the compact 300- and 500-kva units can save as much as 45% of the valuable space required by earlier models.

For further information, call your General Electric Sales Engineer, or write for Bulletin GEA-7222, General Electric Co., Schenectady, N. Y.

\*Air switches shipped separately †Reg. Trade-mark of General Electric Co.



WIDE VARIETY of combinations is possible because of the General Electric distribution-center "building blocks" illustrated here.



**ALPHOLITE**: **INSULATION** provides inorganic dielectric barrier for all dry-type units.

STURDILY DESIGNED liquid-

STURDILY DESIGNED liquidfilled internal structure gives transforming section longer life.

‡Trade-mark of General Electric Co.

Progress Is Our Most Important Product

GENERAL & ELECTRIC

# Beefed up for hardest



Stellite coated exhaust valves and valve seats. One of toughest alloys known. Gives you up to 300% longer valve life than uncoated valves. It's the important details like this that make Onan more economical in the long run.

**Exacting standards** govern manufacture—years of specialized experience and extensive testing facilities control the quality of Onan Power Plants. Over 1000 different types and sizes of plants are produced by Onan.





# use...even abuse

# Onan electric plant still delivers full power after 12,197 hour test—equal to 487,888 miles

A grueling endurance test that lasted one year, nine months and 12 days could not stop Onan test plant #1068. Onan engineers used this production-built unit for an endurance run—and after it was all over, it still generated the full rated power promised on the nameplate. Proof that Onan's exacting standards and production testing give you a power plant with long, dependable life built in.

Over 1,700 other endurance units have been run by Onan engineers. In these tests every design feature and part has to prove itself before it can become a part of the Onan you buy. In addition, every type and size Onan plant is tested under all operating conditions which could conceivably affect performance on your job.

Hours of running in and testing under full load are given every Onan before it is shipped. An independent testing laboratory then spot tests Onan Plants that have already been tested by Onan—double assurance that every Onan will deliver its full nameplate rating. Only then does an Onan production run qualify for Performance Certification.

Buy proven performance when you buy an Electric Plant. See your authorized Onan distributor or dealer. You can depend on him for a lifetime of factory parts and service. He's listed in the Yellow Pages.

## ONLY ONAN GIVES YOU THIS CERTIFICATION



ONAN DIVISION, STUDEBAKER-PACKARD CORPORATION . 2581 UNIVERSITY AVE. S. E., MINNEAPOLIS 14, MINNESOTA



FROM MANUFACTURERS OF CONDUIT SINCE 1910 . . .

HIGH QUALITY

# RIGID STEEL CONDUIT

A TYPE TO MEET ALL REQUIREMENTS

HOTKOTE-Special, hot-galvanized exterior and interior surfaces provide bond with concrete and allow easy pulling of wires. Threads hot galvanized after threading to prevent rusting. U/L Approved and meets Fed. Spec. WWC 581c.

GALVAKOTE-Electro-plated exterior, including threads, prevents corrosion, assures long life. Interior surface evenly coated with baked-on enamel to provide smooth finish for easy "fishing". Will not flake or chip. U/L Approved and meets Fed. Spec. WWC 581c.

ENAMELKOTE-Both interior and exterior surfaces coated with high-grade, baked-on black enamel. Bends, cuts and threads easily without flaking. Accurately cut standard gauge threads. U/L Approved and meets Fed. Spec. WWC 571a.

And to complete the conduit line . . .

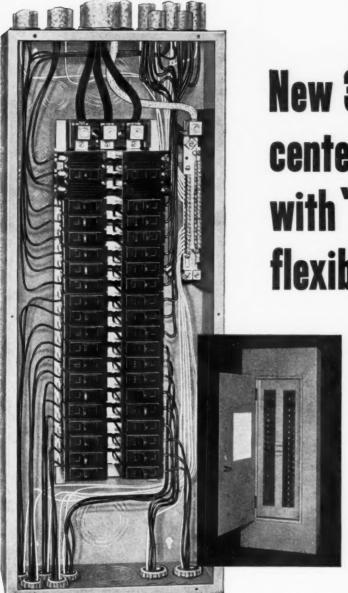
ELECTRICTUBE EMT-Satin-finish, closegrained, electro-galvanized EMT has exceptional corrosion-resistant life. Super-smooth interior surface permits easy fishing of wire. Bends easy . . . saves money on job. U/L Approved and meets Fed. Spec. WWT 806b.

ALUMINUM-Lightweight, corrosion-resistant, easy to bend and cut. Color-coded thread protectors. Cuts handling and labor costs. Conveniently packaged in 10' lengths in all diameters. U/L Approved.

> DISTRIBUTED IN ALL 50 STATES AND THROUGHOUT THE WORLD



4540



# New 3 phase load centers to 200 amps with "TWIN" breaker flexibility

- Full line of 3-phase, 4-wire load centers . . . 12 to 42 circuits . . . 125, 150 and 200 amperes.
- Sequence phased for maximum versatility with "TWIN," 1-, 2-, and 3-pole breakers... meets NEC noninterchangeability requirement for breakers... U/L listed.
- Snap-out interior . . . empty box mounts fast, leaves plenty of room to pull in wires . . . reversible box and interior . . . extra wide gutters.
- Tumbler type locking kit available... sealing loops...lugs accept copper or aluminum wire.

Cat. No. TRP42-420S 200 amperes . . . 42 circuits \*Trade Mark

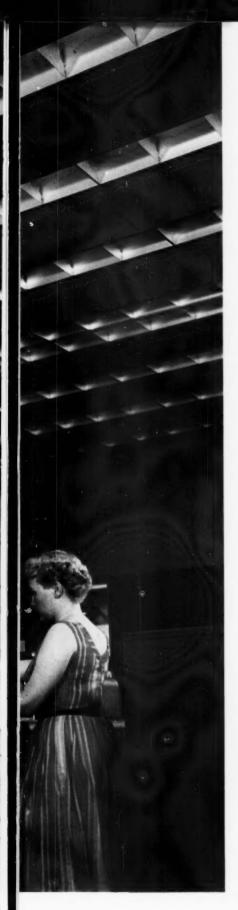
The new General Electric 3-phase load centers now provide the same time and cost saving features as the popular line of residential "TWIN" load centers. They're in stock now at your local G-E distributor, for either flush or surface mounting and in 12, 18, 24, 30 and 42 circuits to 200 amperes. 12 and 18 circuit models also available in raintight boxes.

For more information, write General Electric Company, Plainville, Conn. Ask for Bulletin GEA-7076.





Wall-mounting of this compact QHT transformer provides bonus floor space for equipment and personnel.



# Lighter, smaller General Electric QHT transformers give bonus floor space

The new General Electric QHT dry-type transformers save you production space because they offer savings up to 50 percent in weight and 67 percent in size compared with competitive dry-types. QHT units up to 75 kva have built-in provisions for wall mounting, and larger units can be set in out-of-the-way places near the load, saving the cost of long, low-voltage feeders.

A new insulation system permits use of smaller coils to reduce size and weight of QHT transformers. Inorganic silicone impregnated insulation is highly resistant to water, dust, and corrosive atmospheres. Also, aluminum conductors and cold-rolled, grain-oriented silicone steel combine to give you a smaller, lighter, quiet transformer designed for years of dependable service.

QHT dry-type transformers are easy to install. Units have conveniently placed, dual-sized knock-outs, large terminal compartments and wiring spaces. All wiring can be done from the front.

QHT transformers are quiet—at least 15 decibels quieter than older designs. All have sound levels equal to or less than NEMA standards.

You can get 24-hour delivery on most models from your nearby General Electric distributor. Call him for complete information, or write for GEA-6907A "QHT Specifier's and Buyer's Guide" to Section 411-16, General Electric Co., Schenectady 5, N. Y.

\* Registered trademark of General Electric Company for quiet, high-temperature dry-type transformers.

# Progress Is Our Most Important Product



## COMPARE . . . G-E Transformers are 32% to 67% smaller



	NEW	TRANS.	TRANS.	TRANS.
45 KVA				
Height (in.)	261/4	41 1/4	30	32
Width (in.)	24	28 5/8	31	22
Depth (in.)	19	26	19	281/
Weight (lbs)	430	780	790	500
Volume (cu. in.)	11,970	30,695	17,670	20,064
225 KVA				
Height (in.)	441/4	60	50	663/4
Width (in.)	41	54	56	55
Depth (in.)	243/4	30	28	37
Weight (lbs)	1500	2300	3000	2500
Volume (cu. in.)	44,902	97,200	78,400	135,836

<sup>†</sup> Transformers "A," "B," and "C" represent products of well-known transformer manufacturers. Data was taken from current published information.

Here is the tool that permanently anchors a duct strap to concrete with less than ten taps of a hammer. Without drilling or plugging.

It's called Shure-Set.®

It does plenty of other fastening jobs too. Junction boxes, conduit clips, gutters. Heaters, signs, Wiremold. Using Shure-Set you can attach almost anything to concrete and other masonry materials. And you do it rapidly.

How is it possible? A special steel fastener is inserted at one end of Shure-Set, your hammer blow is directed against the large movable anvil at the other end. The easy-to-hit anvil concentrates the force of the hammer blow onto the fastener, but within the confines of Shure-Set's precision bore. The fastener can't waver or skew off. Every swing of the hammer drives it straight and true into the concrete. (Note: powder charges are *not* used in this tool.)

And Shure-Set's austempered steel fasteners never bend or break. Austempering has given them the ideal metallurgical properties for penetrating hard construction materials (it's the same heat treatment we give our *powder-driven* fasteners). These steel drive pins ("nails") and threaded studs make a strong, permanent, compressive bond to concrete. For a light-duty fastening, you won't find anything stronger.

And for the few cases—such as tile or glazed brick—where "tap-and-turn" work is unavoidable, a drill holder attachment is provided for converting Shure-Set into a superior masonry drill. Still another attachment fits it for use in fastening sheet metal to sheet metal.

Shure-Set is on its way to becoming a tool box standard because of its immense versatility. And because it pays for itself by saving time. Usually on the very first job. It also saves a lot of (put your own price on it) perspiration.

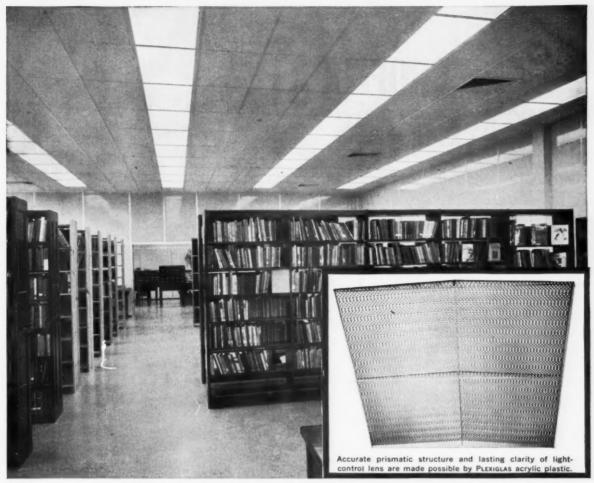
To find out where to buy Shure-Set nearest you, look under TOOLS in the Yellow Pages of your directory.



285.I Winchester Ave., New Haven 4, Conn.

WINCHESTER-WESTERN DIVISIO

Olin



Control lenses molded of Plexiclas mounted in continuous rows in library of County of Sonoma school administration building, Santa Rosa, California. Architects: Steel & Van Dyke, Santa Rosa,

# Plexiglas...for lighting that stands out and stands up

When lighting equipment includes control lenses molded of PLEXIGLAS® acrylic plastic, the result is illumination of the highest quality. This is because PLEXIGLAS makes possible a precisely designed optical element that directs light to the area where it is required and, at the same time, minimizes the surface brightness of the lens as seen from normal viewing angles.

In addition, lenses of PLEXIGLAS remain free of discoloration even after years of exposure to fluorescent light. They are strong and rigid yet light in weight, resulting in safety overhead and ease of maintenance. And the crystal clarity of PLEXIGLAS assures full utilization of light.

Full details on the use of PLEXIGLAS as a lighting material are contained in our 40-page technical bulletin "PLEXIGLAS for Lighting". We will be glad to send you a copy.



In Canada: Rohm & Haas Co. of Canada, Ltd., West Hill, Ontario

# PLEXIGLAS

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . SEPTEMBER, 1961

# FASTER, **MORE PROFITABLE INSTALLATIONS**

with factory-assembled Executone intercom and sound systems

Here's one of five reasons why you can put in top-quality Executone systems at lowestinstalled-cost. Executone equipment is engineered for least assembly time on the job. Every unit comes completely assembled and factory-tested-even consoles, racks and reproducers. Components have plug-in terminal blocks, to cut hook-up time to a bare minimum. Check these other profitbuilding Executone



- EXPERT PRE-PLANNING: assistance in system layout, preparation of bids and estimates.
- even including special color-coded wire.
- INSTALLATION SUPERVISION helps you finish fast . . . assures proper hook-up, adjustment, check-out.
- COMPLETELY ENGINEERED SYSTEMS from one source— NO SERVICE CALL-BACKS because Executone takes full, immediate responsibility for operation of the system.

Start building profits the Executone way. Check the coupon below for information on Executone sound and communication equipment for selected building types. We'll also send you a convenient Conduit Selection Chart to help you cut costs in layout and installation.

COMMUNICATION AND SOUND SYSTEMS

Executone, Inc.	, 415	Lexington	Ave.,	Dept.	F-12,	New	York	17, 1	4. I	
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Send me your Conduit, Wire and Cable Chart. Also: information on Executone equipment for schools hospitals offices plants retail stores homes other

Company

Address Zone City\_

In Canada: 331 Bartlett Avenue, Toronto

Extras:

# IDEAL WIRE-NUT

Builders' First Choice -- Here's Why...

WIRE CONNECTOR



The Wire-Nut success story is really quite easy to explain. Wire-Nut is the first choice of more contractors and electricians everywhere because Wire-Nut is so safe, so sure, so simple! Perhaps it just sums up as dependability. Since 1928 (when Ideal introduced Wire-Nut as the first successful screw-on wire connector) electrical men have come to depend on Wire-Nuts. They are the proven safe connectors that splice with a shake-proof, wire-crushing grip. U.L. has approved Wire-Nuts for every normal solid and/or stranded wire combination. And Wire-Nut screws on any wire combination with a simple twist of the wrist, to make the strongest, most permanent wire joint known. FREE CATALOG. Write today for your free copy of the new Ideal Contractor Catalog.

Sold through America's leading distributors . In Canada: Irving Smith, Ltd., Montreal

IDEAL INDUSTRIES, Inc., 1041-1 Park Avenue, Sycamore, Illinois

TOEAL the helping hand on every wiring job.

1st CHOICE



# What does it cost after you pay for it?

The \$1,895\* we charge for a Volkswagen Truck is only the beginning.

The cost goes up every time you buy gas. Or tires, Or oil, Or parts.

But

This isn't the only truck that runs on gas, oil and tires.



VW trucks average 24 mpg, regular gas.

In fact, some VW owners say our trucks use only half the gas their former trucks did.

Drivers doing 24,000 miles a year often tell us their VW took only \$400 worth of gas.

Where their former trucks took \$800.

It doesn't surprise us. The efficiency of our magnesium-aluminum engine is a legend. Almost all VW trucks get over 20 miles a gallon. Some get 30.

Our average is 24.

This is due to the elimination of dead weight. The whole truck weighs only 2,282 lbs. A loaded VW is almost as light on its feet as a conventional truck empty.

This also means less weight on tires. Most trucks in our class get about 20,000 miles on a

set. We get 35,000. Sometimes 40,000.

You save another \$100 there. Every time around.

Volkswagen engines almost never need oil between changes. And never need anti-freeze at all. They're air-cooled. No water to freeze up in winter or boil over in July.

Service? Owners tell us they put only half the money into VWs that they put into maintaining their old trucks.

After all, we've made the same basic model for 12 years now. We've improved almost everything in it. And then improved most of the improvements.

(We try to make parts for new VWs fit old ones, too. Our spares are often better than the parts your VW came with in the first place.)



Deliver next to nothing and still make a profit.

Now then.

Taking just gas and tires, the man who saves \$450 a year will save \$1,350 in 3 years—the time many owners take to finance a new truck.

Does this mean the Volkswagen costs only \$545?

Can that be?

# Jack Kenny Wins LOOK Contractor Award for residential wiring promotion

Uses Murray
GUARANTEED FOR LIFE
Sales Aids to Help
Boost Rewiring Sales



Jack Kenny is being congratulated by Jack Catherwood of Long Island Lighting Co., Chairman of Residential Task Group, National Wiring Bureau and Al Palumbo, Long Island salesman for Murray Manufacturing Corp. on winning a LOOK award.

"For outstanding performance among electrical contractors in promoting residential wiring."

So reads the citation presented by LOOK magazine to Jack Kenny, President of K. J. Kenny, electrical contractors in Mineola, N. Y. Jack's promotional efforts to alert home owners to the need for adequate wiring to handle today's appliance loads paid off in increased sales.

The successful formula used by Jack Kenny was "Survey . . . Sell . . . and Satisfy." Find out which homes are still using low amp service; sell the homeowner through informative, hard-hitting direct mail and personal follow up; then satisfy him with a sound, high quality installation.

The "satisfier" used by Jack Kenny was Murray's guaranteed for life, MP fully magnetic circuit breakers. The Murray GFL Certificate presented to the homeowner, when the installation was completed, convinced him that he had made a wise decision . . . and a satisfied customer is still the best advertisement for an electrical contractor.

Murray promotional literature, particularly our popular consumer stuffer, played an important part in helping Jack Kenny sell adequate wiring to his many prospects.

Why not find out how you can cash in on the Murray Guaranteed for Life promotion program to build business, profits and prestige. See your Murray wholesaler today, or write directly to our GFL Merchandising Dep't.



#### MURRAY MANUFACTURING CORPORATION

1250 Atlantic Ave., Brooklyn 16, N.Y.

Survey: Dave Edwards makes periodic survey of homes with 30 amp service to build prospect list.

Sell: Frequent direct mailing of Murray GFL promotion material to prospective customers sells them on the benefits of adequate wiring.

Satisfy: Al Northup, right, is pleased with his new load center with Murray's "Guaranteed for Life" circuit breakers.







# FOR ALL CONTROL CABLE NEEDS ... SPECIFY SIMPLEX CABLE

RUBBER, PVC, SILICONE, POLYETHYLENE-NYLON, POLYETHYLENE-PVC, POLYETHYLENE, TEFLON

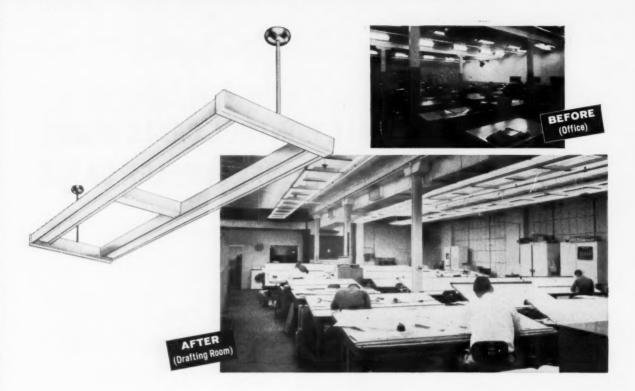
You name the requirement: supervisory cable for monitoring and/or recording; cable for protective devices, for heavy magnetic trip or break devices; control cable for use in conjunction with high voltage power circuits. Simplex will supply it . . . engineered precisely to specifications.

Simplex control cable insulations include rubber (Anhydrex, Anhydrex XX), PVC, Polyethylene, Polyethylene-Nylon, Polyethylene-PVC, Silicone and Teflon. And they meet all IPCEA-NEMA standards.

Simplex cables are available with copper, bronze, aluminum and steel C-L-X sheaths or with a variety of other jacketing materials. Also available are packaged combinations for power and control.

Simplex welcomes the opportunity of discussing individual control and power cable problems. Write today, giving details.





Sylvania's HQ Fixture provides

NORGE Division of Borg-Warner

QUALITY Lighting

ECONOMICALLY

The Norge Division of Borg-Warner Corporation in Effingham, Illinois, faced a common problem. They wanted better lighting in their office and drafting room... to eliminate shadows and glare... to make seeing easier... to enable engineers to perform their critical work without cumbersome auxiliary lighting equipment. And they wanted this new illumination system at reasonable cost.

The happy solution—Sylvania's HQ Series fixtures using 1500 ma (VHO) lamps, together with a newly-painted ceiling area. These indirect fixtures with 75% upward component provide 120 footcandles (measured) of well-diffused quality illumination. Glare and shadows are non-existent. The need for supplementary lighting equipment has been eliminated.

Sylvania's fixtures met the final requirement, too. This system of HQ Fixtures cost considerably less than other systems that had been suggested.

The installation at Norge is another example of how, with Sylvania Fixtures, you can choose the lighting fixtures that fit the requirements of *your* job. No *one* fixture meets the requirements of *all* installations. But with Sylvania's fixture line, you can choose the lighting that fits your needs best. And you'll get top-flight performance from every one.

When you want better lighting . . . look into the many advantages that Sylvania offers.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS INC.
One 48th Street, Wheeling, West Virginia

LIGHTING FIXTURES BY

# SYLVANIA

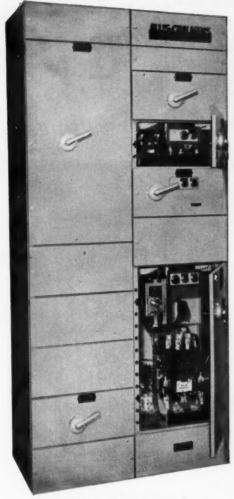
SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS



# **ALLIS-CHALMERS**





1. Centralized control saves space, cuts installation and engineering costs.



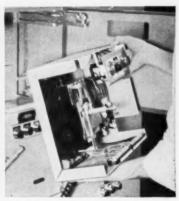
Exclusive plug-in terminal blocks permit removal of units without tools. Fully accessible location at front of units simplifies your wiring.



3. Extra heavy plug-in stabs and positive alignment provided by TRACK-GUIDE drawout mechanism assure trouble-free electrical connection.



With TRACK-GUIDE mechanism, units can be easily and safely de-energized and locked out, or withdrawn from enclosure for inspection and maintenance.



5. Units can be tilted up for inspection of stabs without removing from TRACK-GUIDE mechanism, or fully removed for bench maintenance or interchange.

...six reasons why Allis-Chalmers new motor control center design is

# the center of satisfaction

Satisfaction? It comes with every one of the new (yet fully proven) low-voltage control centers from A-C. Their clean lean design saves valuable space. Exclusive plug-in terminal blocks cut installation time . . . speed inspection and removal. *Track-Guide* drawout mechanism lowers maintenance costs. Control units can be drawn out, tilted up, or completely removed without tools.

Safety features of these new control centers provide *sure* protection to personnel. Units can be quickly de-energized for maintenance or inspection work. Units cannot accidentally fall out of *Track-Guide* mechanism during inspection or maintenance.

Reliability . . . versatility . . . economy . . . strength . . . safety. You name the feature — A-C motor control centers have it. Ask your A-C representative or distributor for all the facts. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1. Wis.

Track-Guide is an Allis-Chalmers trademark.

A-148



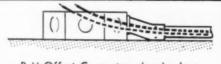
Mounting of pilot lights and pushbuttons on the removable control units eliminates failures common with hinged wiring.

# It's a Breeze! Just a *Double Squeeze*Sets Up E. M. T.

With Original B-M Indenter Fittings



B-M Indenter Fittings and Tools make an unbeatable combination when it comes to easier E.M.T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws. Other plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—Extra heavy positive bonding locknuts—Smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall thickness.



B-M Offset Connector, showing how wires are guided over box edge.

Briegel All Steel Indenter Fittings are U.L. approved as Concrete-Tight.



# RRIFGFI

METHOD TOOL CO.
GALVA, ILLINOIS

All B-M indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.



USED THE MOST FROM COAST TO COAST

# PYLE VAPORTIGHT LIGHTING FIXTURES



PEC-9 EPOXY FINISH Corrosion-resistant PEC-9 white coating (standard) protects against salt spray, acid fumes, strong caustics and organic liquids. Eliminates application in field of special compounds.



Stainless steel ball detents allow for snap on and off of guard for easy lamp removal. Reflectors are removable by a 45° turn for convenient cleaning and have four selflocking nylon shoes.

The interchangeable straight and 90 degree bracket mounting adapters fit both 100 watt and 200 watt fixture sizes. This allows for better inventory control and easy interchange in the field.

ADDITIONAL FEATURES Heat resistant globes are standard in a choice of colors. Specification grade porcelain lamp grip socket and all white porcelain enameled reflectors. Lamp holder gasket seals off wiring and lamp compartments. All gaskets are exclusively oil resistant nitrile rubber-asbestos compound and are heat resistant up to 800°F. Fixtures are UL listed and meet Navy, Corps of Engineers and General Service Administration specs.

Sold nationally through authorized distributors Also manufactured in Canada by: Pyle-National (Canada) Ltd., Toronto, Ontario

When dependability

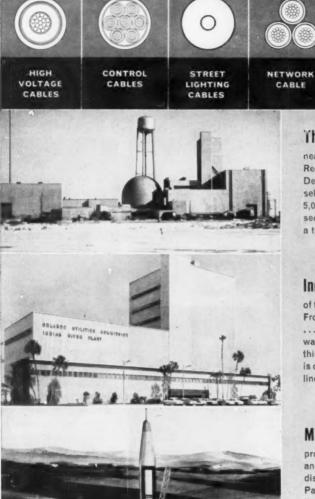
is of vital nature

...a natural selection

is proven-quality

The consistent selection of Paranite by Power Users in all parts of the country is significant of its dependability. Producing reliable, high-quality power cable has been a Paranite specialty for 71 years... from 600 volt network through 28,000 volt power cable. You can depend upon it... "If it's Paranite, it's right."

# PARANITE POWER CABLE





SERVICE

CABLE



AIRPORT LIGHTING CABLES



BRACKET CABLES

The Enrico Fermi Atomic Power Plant

near Monroe, Michigan, operated by the Power Reactor Development Company and the Detroit Edison Company. Paranite was selected to supply 600 V. network and 5,000 V. shielded cable for the nuclear section. Illustrated at right is a typical Paranite Power Cable.



## **Indian River Generator Plant**

of the Orlando, Florida, Utilities Commission.
From transmission line . . . to power cable
. . . through control cable . . . Paranite
was specified to carry the load in serving
this growing area. Illustrated at right
is one of Paranite's complete
line of 600 V. Network Cable.



#### Missile Bases

provide another example of the widespread and diversified use of Paranite in power distribution throughout the nation.

Paranite Control Cables are produced in a complete range of insulation and jacket types. Illustrated at right is a typical Paranite Control Cable.



For more information on high voltage, control, street lighting, network, service and airport cables contact your local Paranite representative...or write Paranite Wire and Cable Division, Dept. 204, 2601 S. Adams St., Marion, Indiana. Since 1890

#### PARANITE WIRE & CABLE DIVISION

ESSEX WIRE CORPORATION, Marion, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Anaheim, Calif. Sales Offices and Redistribution Warehouses in all Principal Cities



#### How to determine proper Control Run for Remote Control Switches

With remote control switches (as with any electromagnetically operated device), it is absolutely essential that maximum allowable run for each switch should not be exceeded.

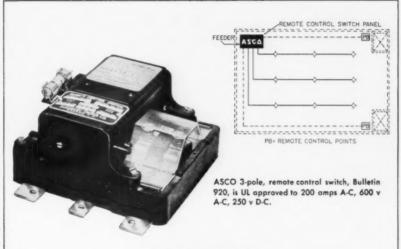
Here is a handy guide to help you determine admissible distances between switch and remotely located control station:

- 1. Doubling the control voltage will increase the allowable run with the same size of wire by about 4 times.
- 2. Doubling the cross sectional area of the control conductors will increase the allowable control run by 2 times. The cross sectional area of a conductor will approximately double with three gauge number sizes larger wire. Thus #14 has approximately double the area of #17, and onehalf the resistance per unit length.
- 3. Full consideration should be given to the use of auxiliary relay control for remote control switches, particularly for group installations requiring master control and for extremely long runs.

The following tabular data specify maximum distance between control station and one Bulletin 920 switch with source line voltage at 90% of normal. Similar charts are available on the range of ASCO "remotes."

	8&5	DISTANCE	IN FEET
	GAUGE	110 V.	220 V.
AMPERES		60 CYS.	60 CYS.*
	14	550	1600
30,60,75	12	900	2600
	10	1400	4200
	14	325	1200
100,150,200	12	500	1900
	10	800	3000

\*For 208 volt system, reduce 220 volt values by 30%.



#### Why Mechanically Held

A remote control switch is essentially a feeder disconnect switch. Consequently, it is usually installed in a lighting or power distribution panel feeding numerous circuits. In function the disconnect switch used should operate just like the manually operated type of disconnect switch-it should be unaffected by line voltage conditions and should respond only to the control of the push buttons.

Only a mechanically held switch can meet these requirements. Magnetically held contactors, which open on momentary line voltage dips and control circuit derangements, introduce the hazard of complete outage on vital circuits until repairs can be

ASCO Mechanically Held Remote Control Switches are unaffected by line voltage conditions; each switch includes a manual operating knob or handle so that the switches can be operated manually at any time.

The values for control run listed are for one switch. For installations involving more than one remote control switch connected to the same control conductors, the values listed can be considered as switch-feet. The allowable run for group installations will be equal to the listed values divided by the number of remote control switches operating from the same control conductors. Thus, if one switch has an allowable run of 100

feet with #14 wire, ten switches will be limited to 10 feet. When switches are located along a transmission control line, calculations in terms of switch-feet will produce the solution.

#### Dependable control by ASCO

New catalog 57-S2 on ASCO Remote Control Switches is now available. Write today for this basic reference on dependable electromagnetic control.

#### ASCO Electromagnetic Control ASCO.



DEPENDABLE CONTROL BY AUTOMATIC SWITCH CO. 501 HAMOVER RD., FLORHAM PARK, N. J. - FRONTIER 7-4600 - AUTOMATIC TRANSFER SWITCHES - SOLENOID VALVES - ELECTROMAGNETIC CONTROL



### This marker frees one man from tracing cables

The Amprobe Cable Tracer\* enables you—by yourself—to trace ten uncoded circuits simultaneously ten times faster than any other method. Simply plug one end of the conductors to be traced into the markers (there are ten of them), the other ends, in pairs, into the pocket-sized Cable Tracer, press the button, and a number lights up to provide unmistakable identification. See your distributor or write today for more details.



Here are some typical, broad category applications:

- Trace commercial and residential conduit wiring.
- Identify circuits in intercom and p.a. equipment.
- Trace multi-conductor cables in control circuits.
- Correct errors in labeling on panel boxes. Test for ♠ opens and shorts. \*\$39.50 (higher outside U. S.).

AMPROBE INSTRUMENT CORP.

EN CANADA: ATLAS RADIO CORP., 50 WINGOLD AVE., TORONTO



#### AM ELECTRICAL EQUIPMENT

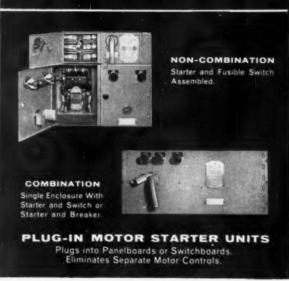
The Industry's Best Buy In Safety, Performance, Durability





Last Word in Heavy Duty Fusible Protection.





No matter what the size and complexity of the project—no matter if the need is for the largest switchboard or the smallest safety switch—the Frank Adam name upon it is a warranty of unsurpassed quality and craftsmanship, protection and durability.

Give your clients every benefit in safety, dependability and economy of the "industry's finest"—specify, insist on, Frank Adam Electrical Equipment.

Write for catalog literature

FRANK SINCE 1891

ADAM ELECTRIC COMPANY
P. O. BOX 357, MAIN P. O. ST. LOUIS 66, MO.

busduct · panelboards · switchboards · service equipment · safety switches · load centers · Quikheter



# MAKE THE CHANGE AND COUNT YOUR SAVINGS

See how the switch from copper to Rome's *aluminum* service entrance cable can improve your competitive position.

It's a fact: Aluminum service entrance cable usually costs less than copper cable required to do the same job. Just how much less depends on service, size and the amount of each kind of cable you use. Check the tables on the right and compare the difference between the cost of copper and the equivalent in Rome's aluminum service entrance cable. Then multiply the difference by your requirements. There's your saving—and no question about it. And don't forget that aluminum's light weight makes it easy to handle. The weight it saves is weight you'll never have to heft, load, unload and carry to an installation site! The savings in dollars and ease of installation speak for themselves. If you'd like the complete story on performance, availability and installation, contact your nearby Rome distributor or sales representative. Rome Cable, Division of Alcoa, Dept. 7-91. Rome, New York.



ALUMINUM service entrance cable from the Rome Cable Division of Alcoa is available in two- or three-conductor types, insulated with Underwritersapproved heat- and moisture-resistant compound. The insulated conductors are enclosed in a color-coded protective tape. The concentric conductor consists of a spirally applied conductor having a circular mil area equivalent to the AWG size specified for the neutral conductor.





# ROME SERVICE ENTRANCE CABLE THREE CONDUCTOR . TYPE "SE" . STYLE "U"

Underwriters Approved

S	ING	SAV	IUM	JMIN	AL	ER	OPPE	C
	PERCENT/ (Approx	DOLLARS	PER 1000 FT.	INSULATED CONDUCTOR SIZE AWG	CIRCUIT RATING IN AMPS	PER 1000 FT.	INSULATED CONDUCTOR SIZE AWG	CIRCUIT RATING IN AMPS
6	29	6	235	4	60	241	6	60
6	269	104	303	2	100	407	3	100
8	409	312	472	1/0	125	784	1	125
6	459	427	520	2/0	150	947	1/0	150
8	499	686	704	4/0	200	1390	3/0	200







#### OVER 7,500 ELECTRICAL FITTINGS AND FIXTURES

Only Killark provides copper-free aluminum equipment in such a complete range of sizes and styles. Having the right enclosure available for the application means greater design freedom, better operating efficiency, lower costs.

#### YOU GET FAST DELIVERY ON KILLARK ELECTROLETS

Order from your Killark distributor. He has the item you need in stock for immediate delivery. If not, he can get it promptly from a nearby Killark warehouse. There are 18 of these dependable supply sources located throughout the United States and Canada.



ELECTRIC MANUFACTURING COMPANY

Vandeventer and Easton Ave. . St. Louis 13, Missouri

In Canada: Killark Electric of Canada, Ltd., 421 Islington Ave. South, Toronto 18, Ont.

# General Electric brightest 40-watt fluorescent ever

Here's money-saving news for 40-watt fluorescent users. General Electric's NEW F40 gives a 7% bonus in light at no extra cost. Now your customers can get their desired lighting level with fewer lamps and fixtures. Or they can increase their existing lighting level without spending a single extra penny for lamps, fixtures or electricity.

Only General Electric offers this bonus in standard 40-watt "white" fluorescent lamps. The G-E NEW F40 is rated at 3100 lumens in popular cool white, 3250 in white or warm white-extra light worth 15¢ to 30¢ a lamp to most of your customers. Yet the list price for this lamp is the same as ordinary fluorescents.

# announces the cool-white made...

The bonus of light your customers get with General Electric's *NEW F40* is made possible because of these G-E Premium 3 construction features:

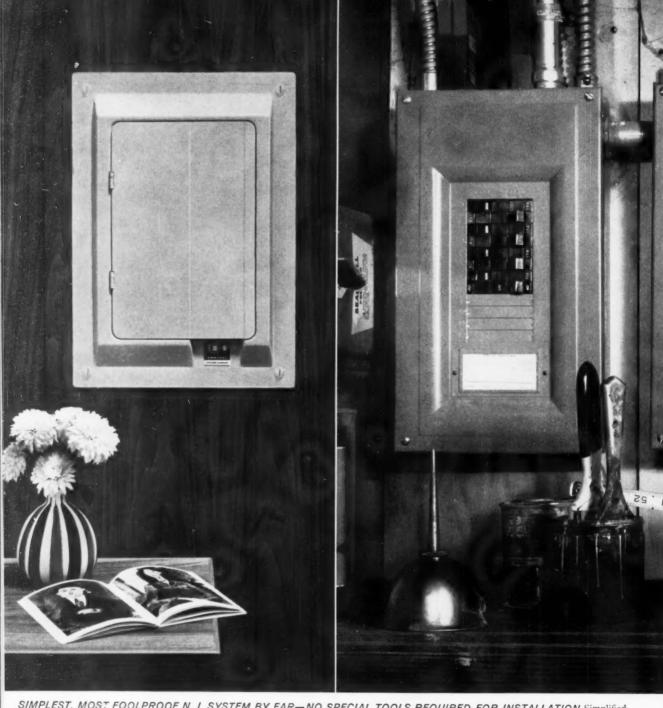
- 1. G-E wattage-miser electrode helps convert power ordinarily lost in the cathode into useful light—free.
- 2. New, more efficient gas mixture.
- 3. New electronically screened bonus-phosphor.

And all these light producing features are available for the first time in a lamp that sells for the same price as ordinary fluorescents—only \$1.30 for the popular cool white, \$1.35 for other "white" colors.

Designed for both Rapid Start and starter-type circuits, the *NEW F40* has a life rating of 7500 hours for most circuits (6000 hours for systems installed before 1954). To get 7500-hour life in pre-'54 circuits, F40/54 lamps are available. They give the same light as ordinary 40-watt fluorescents (2900 lumens) and list for the same price (\$1.30 in cool white). General Electric Co., Large Lamp Dept. C-122, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

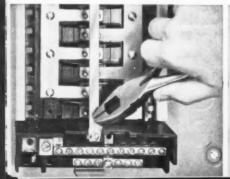


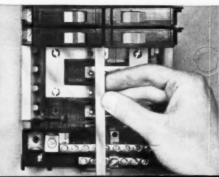
SIMPLEST, MOST FOOLPROOF N. I. SYSTEM BY FAR—NO SPECIAL TOOLS REQUIRED FOR INSTALLATION Simplified Safetybreaker system eliminates fussy keying systems, makes it impossible to incorrectly position tabs. Here's the Safetybreaker method:

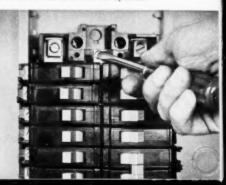
1 Simply tear off soft plastic spacers to loosen locking-bar screws, and let locking bar drop.

2 Plug in breakers in top portion of panel. Slide bar to top of panel.

3 Plug in remaining breakers. Tighten two screws to lock the NI system.









Why settle for an old-fashioned "basement gray" box?

# Get this new, smartly-styled safetybreaker...it doesn't cost a nickel more

(and often costs less!)

Here's a bonus in beauty and protection that gives you—and your customers—extra features at no extra cost.

**Modern appliance styling** lets you show how good your wiring job is. This soft sandalwood finish *belongs* upstairs, convenient to the kitchen, saving you on those heavy wiring runs.

Eliminates housewife confusion and saves you unnecessary call-backs. Simple as a light switch, with easy-to-see "on" and "off" positions. There is no tripped midposition to harass the homeowner, no calls for you to reset the breaker because the housewife mislaid or misread instructions.

**Inside as superior as the outside.** Won't rust, won't corrode because every

operating part is either stainless steel or heavily plated. Double protection with magnetic trip for short circuits *and* bimetal trip for sustained overloads. Easier to install with plenty of wiring room, no knuckle-skinning wire guides.

Want to know more about Cutler-Hammer's New Safetybreaker? Write for free 36-page Safetybreaker Selection Guide. Better yet, see your Cutler-Hammer distributor and let him show you personally.

#### What's new at Cutler-Hammer?

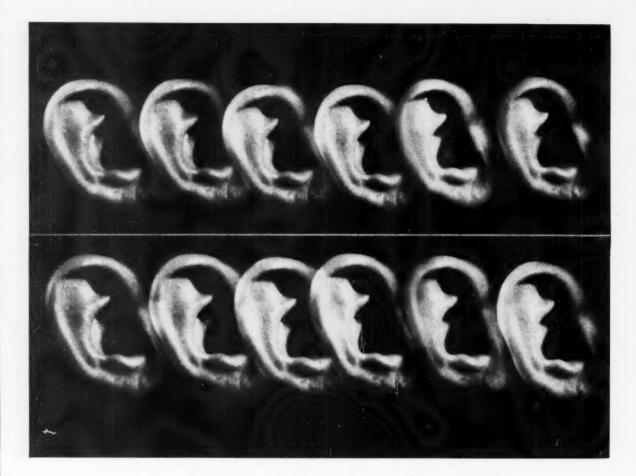
This new Safetybreaker is typical of the *better* products you'll be getting from Cutler-Hammer . . . results of new engineering talent . . . new facilities . . . a new creative atmosphere at every level.

WHAT'S NEW? ASK ...

#### **CUTLER-HAMMER**

Cutter-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutter Hammer International, C. A. • Associates: Cutter-Hammer Canada, Ltd.; Cutter-Hammer Mexicana, S. A.





# The best ears agree

Hevi-Duty Dry-Type Transformers... so quiet you'll get no complaints

Schools, hospitals, motels, hotels... wherever quiet is the first order of business . . . you'll find Hevi-Duty dry-type transformers your smartest choice for installation.

Cores and coils are especially designed to give low decibel ratings. Moisture and corrosion-resistant polymerizing varnish is baked on in two separate operations. Besides giving excellent electrical protection, this results in substantially reduced noise levels. All laminations and components are bonded together tightly to cut vibrations.

Be sure you obtain these features. Specify Hevi-Duty transformers... or write the following into your specifications: Coil and cores "double-impregnated with polymerizing varnish."

For more information, write for Bulletins 100 and 200 or call your nearest Hevi-Duty sales office.

#### Designed sound levels for typical Hevi-Duty dry-type transformers

SINGLE	-PHASE	THREE-	PHASE
KVA	DECIBEL RATING	KVA	RATING
1.0	33	6.0	38
7.5	33	9.0	40
10.0	40	15.0	44
20.0	44	30.0	43
37.5	44	45.0	45
75.0	45	112.5	45
100.0	45	150.0	45
167.0	45	225.0	50
250.0	50	300.0	50
500.0	52	500.0	53

Transformers up to 1000 KVA can be supplied with sound levels of 45 decibels.





tors C

Dry-Type Transformers Constant Current Regulators

HEVI-DUTY ELECTRIC COMPANY

MILWAUKEE, WISCONSIN
A Division of Basic Products Corporation



Now—from SpanG comes a new improved galvanized rigid steel conduit. Here's what it offers you:

#### **NEW** — best thread protection available against rust

... a smooth, uniform zinc galvanized coating on every ridge and valley of every thread ... easy coupling—can be hand tightened the whole way ... no thread chasing ... no excess zinc ... Preece-tested to assure quality and dependability.

#### **NEW** – double galvanized coating on the conduit for extra corrosion resistance

... inhibits white rust formation ... eliminates flaking of finish ... has that fine SPANGLEAM appearance.

#### **NEW** – better packaging for easier handling

... bundled in steel strapping in sizes up through 2"... shipped on a one-ton rectangular lift for convenient transit by lift truck...cuts handling costs—makes inventory easier.

Save installation time, get top protection against rust and corrosion with new SPANG Blue Star Galvanized Rigid Steel Conduit. See your nearby SPANG Distributor for complete details and samples.

SPANG Blue Star Conduit is one of the many fine products produced by National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Penna.





FOR TEMPORARY LIGHT OR POWER-Be sure of total safety on every job—use grounded Cornish portable POWER-LITE LINE. Rated at 125 volts—15 amps, UL-approved POWER-LITE LINE has weatherproof, molded-on 3-conductor male and female connectors. Double-outlet plugs, too, have ground wire. Lamp outlets are molded with shade-holder grooves for guards or reflectors. Molded hangers make installation easy as driving a nail.

Distributors are everywhere—coast to coast. See your phone book. Cornish Wire Co., 50 Church St., New York 7, N.Y.

#### Better Times Ahead

Conceding some late summer doldrums there is an increasing number of signs that the national economy is hitting a new and more vigorous pace. Prospects are excellent for a sustained period of strong and even spectacular economic growth through 1962 and beyond.

The electrical industry should fare very well indeed in these coming months because it will be participating not only in the general upturn but also in its own advancing technology. A more favorable economic climate is bound to encourage broader markets for more sophisticated and advanced electrical systems, lighting applications, heat, power, communication and control.

While construction volume has held up handsomely through many months of business uncertainty and recession, the psychology of these times has had a restraining influence on electrical systems design. Under recession pressures budget-paring on construction projects becomes an end in itself and electrical work invariably suffers.

Better times will help to dispel a lot of prideless austerity in design and allow more emphasis on value, quality and performance. But the electrical industry has got to learn to take a much firmer stand in its own and in its customers' interests against so-called economies achieved by arbitrarily cutting the electrical contract, and stripping it of advanced features and premium values.

The times ahead present both challenge and opportunity. There are many new products, systems and standards of exceptional value and utility for the customer ready and waiting to be incorporated into practical working installations. New frontiers of lighting performance are in prospect. Electric heat in many areas is hardly off the ground. And the markets for new concepts in control and communications are yet to be explored.

A dynamic up-sweep in the economy deserves a rededication on the part of the electrical industry to real values and a strong sense of obligation to the public. Many important developments can reach the public effectively only with the active support and encouragement of electrical engineers and contractors. The customer has to look to us for expert advice, guidance and ultimate performance. He has a right to expect, not the least or cheapest, but the very best of our goods, services and talents.

Um. T. Stuart



#### THE SAFETY SWITCH THAT CHALLENGES COMPARISON!

#### BullDog's general-duty safety switch - a star performer indoors and out!

All BullDog general-duty safety switches, in either indoor or raintight enclosures, combine these outstanding features for maximum safety and dependability:

- Minimum arcing—double-break switching
- Arc control—Vacu-Break® enclosed chamber
- Pressure contacts—Clampmatic® spring action
- Positive switching—direct handle operation

... Plus, all current-carrying parts are silvered. And with BullDog, you sell a complete line, competitively priced, that fills all over-the-counter calls for general-duty safety switches. The switches are available in both NEMA 1 and NEMA 3R enclosures. Challenge our field representative to prove these switches are the finest . . . or write BullDog for details.

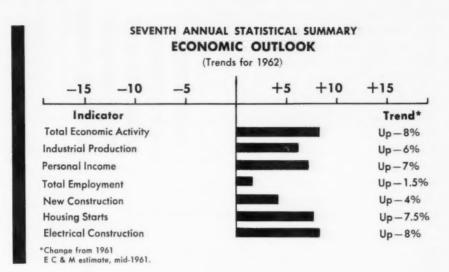


BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.



#### I-T-E CIRCUIT BREAKER COMPANY

BULLDOG ELECTRIC PRODUCTS DIVISION



#### PLAN NOW FOR

# Record Electrical Growth IN 1962

Our economy, surging upward at an accelerating pace and pressured by increased spending by Government, business and consumers, supports an optimistic outlook for record growth and progress for the electrical industry through 1962.

By Berlon C. Cooper

### The National Economy

THE U.S. economy is headed for spectacular growth over the next 15 months, or through 1962. This optimistic outlook is substantiated through analysis of each and every economic indicator, and especially through analysis of cyclical fluctuations of such indicators as gross national product and industrial production over the past several years. The historical pattern of some of

the more important national economy indicators is presented in this report, on a short-range basis, or generally for 1958 to mid-1961. Each of these indicators, however, should be analyzed in the light of the current status of the economy, of current spending plans of the Federal government, of an expanded consumer buying power, of the impact of government and con-

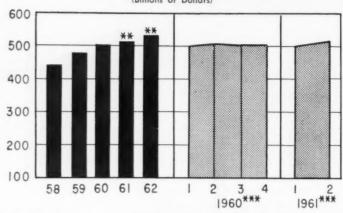
sumer purchases on production in the months ahead, and of all economic forces expanding further and reinforcing one another.

Consider gross national product, for example. Beginning in mid-1959, GNP declined from an annual rate of nearly \$490 billion to about \$475 billion by the end of that year, due primarily to the extended steel strike during this period. Then

#### **GROSS NATIONAL PRODUCT**

(Billions of Dollars)\*

Economic activity for 1961 as a whole will rise slightly over 2% from 1960, about the same as 1960 rose over 1959. But the annual rate by the end of 1962 will rise at least 8% above the current annual rate, based on the mid-1961 outlook. The outlook is for an annual rate of at least \$570 billion by the end of 1962.



\* Current dollars

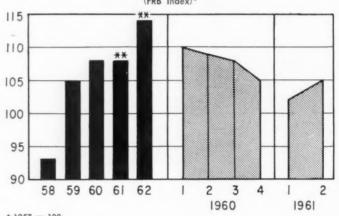
\*\* EC&M estimate, Mid-1961.

\*\*\* Current dollars, seasonally-adjusted annual rate. Source: Office of Business Economics, Dept. of Commerce.

#### INDUSTRIAL PRODUCTION

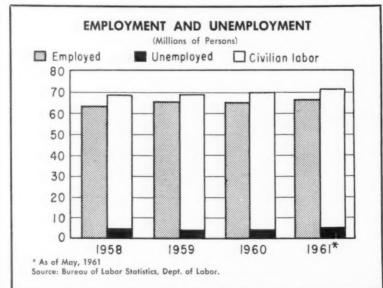
(FRB Index)\*

Switch from inventory liquidation to replacement, rising consumer purchases of both durable and nondurable goods, and expanding government spending for arms, public works, housing and other capital goods (Federal, state and local) will put new pressures on industrial production in the months ahead.



\* 1957 = 100

\*\* EC&M estimate, Mid-1961.



in 1960, it quickly rebounded to \$501 billion during the first quarter, to \$505 billion in the second quarter, then declined slightly through the first quarter of 1961 to slightly under \$500 billion. Thus, from mid-1959 through the first quarter of 1961, economic growth was at an approximate standstill, or actually on a plateau but showing no growth. Then, during the second quarter of this year, GNP rebounded to an annual rate of \$515 billion, and cortinued at this level, due to the usual summer lull, through the third quarter. Already, production is picking up and GNP is responding to the usual autumn surge, will probably reach an annual rate of \$535 to \$540 billion by year's end. Economic growth through 1962 is expected to continue at a rate of about 8%, taking into account the

#### PERSONAL INCOME, TAXES, DISPOSABLE PERSONAL INCOME

(Billions of Current Dollars)

Personal income has continued to increase from year to year since 1958, notwithstanding the economic downturn of 1960-61. But consumers increased savings while they curtailed their spending.

	Personal	Tax	es	Disposable
Year	Income	Federal	State	Personal Income
1958	360.3	36.7	5.7	317.9
1959	383.3	39.8	6.2	337.3
1960	404.2	43.3	6.7	354.2
1961*	420.0*	50.	0*	370.0*
1962*		57.	0*	393.0*
Quarterly**				
1960—1st	396.2	42.6	6.6	347.0
—2nd	404.2	43.4	6.6	354.1
—3rd	408.0	43.8	6.7	357.5
4th		43.6	6.8	358.1
1961—1st		43.3	7.1	357.2
-2nd		50.	0*	363.0*

\*\* Seasonally-adjusted annual rate.

Source: Office of Business Economics, Dept. of Commerce.

#### CONSUMER SPENDING

(Billions of Dollars)

Year	Durable Goods	Nondurable Goods	Services	Personal Consumption Expenditures
1958	37.6	141.9	113.4	293.0
1959	43.0	147.9	120.7	311.0
1960	43.6	152.4	131.8	327.8
1961*	39.2	153.0	136.6	328.8

\*For 1st quarter 1961 only, sasonally-adjusted annual rates. Source: Office of Business Economics, Dept. of Commerce.

#### CONSUMER CREDIT

(Billions of Dollars)

Year	Install- ment Credit	Nonin- stallment Credit	Total Consumer Credit
1958	34.1	11.5	45.6
1959	39.5	12.6	52.1
1960	43.3	12.8	56.1
1961*	42.0	12.0	54.0

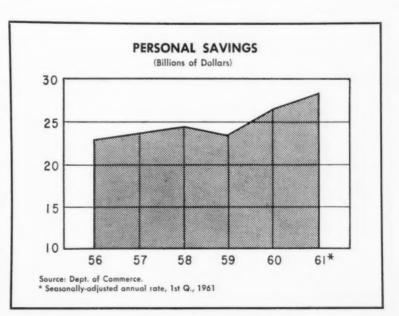
\*End of April, 1961.

Source: Office of Business Economics, Dept. of Commerce.

economic pressures which are now indicated.

Similar patterns exist in the GNP growth curve at two recent periods. In mid-1953 GNP declined slightly to mid-1954, then rebounded sharply to the end of 1957. Again, from mid-1957 to mid-1958, GNP declined slightly, then surged upward to mid-1959 when the steel strike halted the climb.

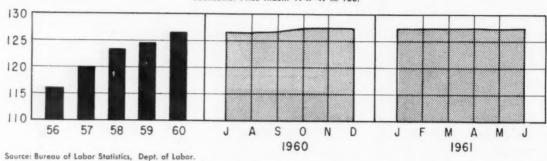
Industrial production has followed about the same cyclical pattern as that indicated by GNP, except that the declines have been more pronounced, and the growth rates have been greater. The production declines and periods of growth have coincided with those for GNP. The FRB Index of industrial production in July was 112% (of 1957 average), exceeding the previous record of 111% in January



#### SEVENTH ANNUAL STATISTICAL SUMMARY

#### **COST-OF-LIVING**

(Consumer Price Index: 1947-49 = 100)



#### FEDERAL GOVERNMENT SPENDING AND GROSS DEBT

(Billions of Dollars)

Fiscal Year	Major National Security	Veterans' Services and Benefits	Agriculture and Agricultural Resources	Interest	All Other	Total	Public Debt
1958	44.1	5.0	4.4	7.7	10.1	71.4	276.3
1959	46.4	5.2	6.5	7.7	14.5	80.3	284.7
1960	45.6	5.0	4.8	9.3	11.7	76.5	286.3
1961						81.5	288.8
Source: Federal Reserve Bulleti	in.						

#### FEDERAL GOVERNMENT INCOME

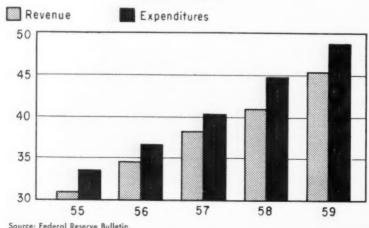
(Billions of Dollars)

Fiscal Year	Individual Income	Corporation Income	Excise Taxes	All Other	Total
1958	34.7	20.0	8.6	5.1	68.6
1959		17.3	8.5	5.4	67.9
1960	40.7	21.5	9.1	6.4	77.8
1961		* * * *			77.6

Source: Federal Reserve Bulletin.

#### STATE AND LOCAL GOVERNMENT SPENDING

(Billions of Dollars)



1960, and is expected to climb to about 120%-122% by end of 1962.

Disposable personal income, or income after taxes, has been growing steadily since mid-1958, while prices have remained relatively stable. Thus, consumer buying power is at an all-time high. In fact, personal income has been rising at a faster rate since 1958 than GNP.

Federal government spending is at an all-time high, is destined to continue its climb at least over the next two or three years. Budgeted expenditures in fiscal 1961 were \$81.5 billion, while tax receipts totaled only \$77.6 billion. Budgeted expenditures for fiscal 1962 are now estimated at about \$88 billion, following recent additional authorizations for national defense. Administration economists and officials believe that the expanded economy will provide the necessary additional revenue to meet the higher spending plans.

State and local government spending is increasing at a rate of about 10% per year, and revenues are increasing at about the same rate. Revenues are not matching expenditures, and higher taxes, or further Federal subsidization, is needed to maintain balanced budgets.

#### The Electrical Industry

HE electrical industry, bolstered by a booming national economy, will soar to new records during the next 15 months. Practically all segments of the industry will participate in this upturn.

During 1962, new records will be set in electric power production and sales, in electrical construction work, in lighting equipment and light source sales, in electric space heating jobs installed, in electric machinery and equipment production and sales, in electronics production, in over-all electric appliance sales, and in other phases of electrical industry endeavor.

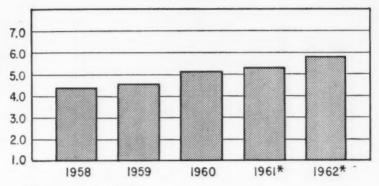
This optimistic outlook is supported by trends and growth patterns now indicated and rapidly emerging for the nation's economy, and especially for those segments of the economy on which the electrical industry is most dependent for its growth. Trends and growth patterns for some of the major economic factors are given in the accompanying charts and tables, as well as for some of the major segments of the electrical industry.

Since the nation's economy has coasted along for the past couple of years without any significant growth (GNP actually declined in the 3rd and 4th quarters of 1960, and 1st quarter 1961), the forces contributing to the outlook for an economic boom already getting under way show up in existing and growing economic pressures, rather than in the statistical record. Basically, these pressures include: 1) an increasing demand for consumer goods and services; 2) a change from inventory liquidation to inventory accumulation; 3) an upturn in capital spending for plant and equipment; 4) disposable personal income and personal savings are at record highs; 5) government spending is at record highs, and increasing; and 6) new construction activity has again started to expand. These forces are interacting, and tend to reinforce one another. When combined with the record of a \$515 billion economy at mid-1961, these forces add up to a boom by year's end, and a possible superboom in the year ahead.

Just how sound this economic growth may be is another subject, and beyond the scope of this report. As a matter of record, however, it

#### **ELECTRICAL WORK IN CONSTRUCTION**

(Billions of Dollars)



\* EC&M estimate, as of mid-1961.

#### 1961 ELECTRICAL CONSTRUCTION

(Millions of Dollars)

(Millions of Dollars)	
Type of Construction	Volume*
Private Funds	
Residential	905
Industrial	527
Commercial and institutional	950
Utilities	407
Farms	91
Other	10
Total Private	2,890
Public Funds	
Residential	27
Industrial	68
Educational	392
Institutional	213
Military	43
Highway and conservation	290
Other	20
Total Public	1,053
Total for new construction	3,943
Total for modernization and repair	1,400
Total electrical construction work	5,343

\*EC&M estimate as of mid-1961.

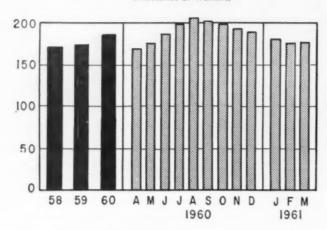
should be pointed out that some government officials are already concerned that this anticipated boom may get out of hand; that anti-inflationary measures may have to be adopted later on. Consider the \$515 billion GNP total at mid-1961, for example. It includes government spending, as well as all other private spending for goods and services. And government spending at mid-1961 consisted of approximately \$100 billion annual rate by the Federal government (including Social Security and

other social and welfare payments), and approximately \$60 billion by state and local governments—or combined, about 31% of the \$515 billion GNP total.

Federal spending is now increasing at the sharpest annual rate in peace-time history, with prospects for an accelerating pace in the foreseeable future, for national defense, foreign aid, military expansion, space age research and development, and domestic economic and social programs. It is the Administration's hope that national eco-

#### ELECTRICAL WORKERS IN CONTRACT CONSTRUCTION

(Thousands of Workers)



Source: Dept. of Labor, Bureau of Labor Statistics.

#### ELECTRICAL WORKERS' HOURS AND EARNINGS

Year	Average Weekly Hours	Average Weekly Earnings	Average Hourly Earnings
1958	38.3	\$135.97	\$3.55
1959	38.4	142.08	3.70
1960	38.4	149.38	3.89
1960—Apr	38.3	147.07	3.84
-May	38.5	148.23	3.85
—June	38.7	149.38	3.86
—July	38.7	150.93	3.90
—Aug	38.9	151.32	3.89
—Sept	38.7	151.70	3.92
—Oct	39.1	155.62	3.98
—Nov	37.8	149.31	3.95
—Dec	37.7	148.92	3.95
1961-Jan	38.4	153.60	4.00
—Feb	38.5	154.39	4.01
Mar	38.8	156.36	4.03

Source: Dept. of Labor, Bureau of Labor Statistics.

nomic growth will expand adequately so that existing tax rates will create enough revenue to meet these expanding Federal expenditures. If not, then additional taxes will be imposed. Also, in case of inflationary pressures, actions are being readied to hold inflation in check—including price, wage and inventory controls, and a possible clamp-down on credit by FRB.

#### **Electrical Construction Work**

The outlook for electrical construction work in 1962 is for an increase of about 8% over the total for 1961. The total dollar volume is set at \$5,770 million for 1962, which compares with an estimated \$5,343 million total for 1961. This increase will result from two factors—an increase of about 4% in

new construction, and a further increase of about 4% for advancing standards and expanding technology.

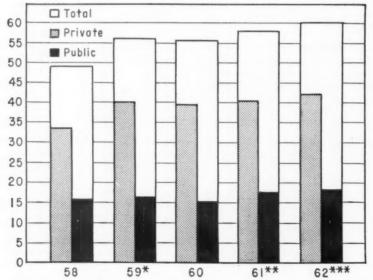
A breakdown of electrical construction work being done this year is shown in the table "1961 Electrical Construction." Analysis of this table indicates that over half of the dollar volume (54%) comes from new construction paid for by private funds, and one-fifth (20%) comes from new construction paid for by public funds. The remaining 26% of electrical construction work is for modernization and repair.

The number of electrical workers now engaged in contract construction is averaging about 5,000 more than for the similar period of 1960, but this number should increase if residential construction continues to pick up as now seems likely.

The average hours worked per week by electrical workers is picking up fractionally, while weekly earnings are up 4.4% from a year ago, and hourly earnings are up 4.7% from the similar period of 1960.

#### GROWTH OF NEW CONSTRUCTION (Billions of Dollars)

(billions of Dollars)



\* New statistical series includes Alaska and Hawaii.

\*\* BDSA estimate, mid-1961.

\*\*\* EC&M estimate, mid-1961.

Source: Business and Defense Services Adm., Dept. of Commerce.

#### **New Construction Activity**

In 1960, construction suffered its first annual decline since the end of World War II. Building dollar volume had made annual gains for 15 years in a row. The drop was only 2%, from the 1959 record of \$56.0 billion, to \$55.6 billion, and may be attributed principally to the \$2 bil-

#### 1961 OUTLOOK FOR NEW CONSTRUCTION

(Millions of Dollars)

	Ac	Dollar Value	Estimate*	% Change
Type of Construction	1959	1960	1961	1960/1961
TOTAL NEW CONSTRUCTION	56,033	55,556	57,800	+4
PRIVATE CONSTRUCTION (Total)	39,848	39,603	40,300	+2
Residential buildings (non-farm)	24,469	22,546	22,500	
New dwelling units	19,233	16,422	16,000	-3
Additions and alterations	4.468	5,199	5,300	+2
Nonhousekeeping	768	925	1,200	+30
Nonresidential buildings (non-farm)	8,859	10,168	10,625	+4
Industrial	2,106	2,851	3,000	+5
Commercial	3,930	4,180	4,400	+5
Office buildings and warehouses	1,954	2,121	2,250	+6
Stores, restaurants and garages	1,976	2,059	2,150	+4
Other nonresidential buildings	2.823	3,137	3,225	+3
	947	1,013	1,025	+1
Religious			610	
Educational	525	566		+8
Hospital and institutional	570	605	715	+18
Social and recreational	550	707	625	-12
Miscellaneous	231	246	250	+2
Farm construction	1,261	1,285	1,300	+1
Public utilities	5,052	5,323	5,575	+5
Railroad	251	285	260	-9
Telephone and telegraph	952	1,088	1,040	-4
Electric light and power	2,072	2,058	2,150	+4
Gas	1,657	1,767	2,000	+13
Other public utilities	120	125	125	
All other private	207	281	300	+7
PUBLIC CONSTRUCTION (Total)	16,185	15,953	17,500	+10
Residential buildings	962	716	800	+12
Nonresidential buildings	4,502	4,792	5,250	+10
Industrial	360	407	500	+23
Educational	2.656	2.818	3,050	+8
Hospital and institutional	428	400	400	
Administrative and service	564	598	675	+13
Other nonresidential buildings	494	596	625	+10
Military facilities	1,459	1,386	1,600	+15
	5,888	5,464	5,900	+8
Highways				
Sewer and water systems	1,467	1,487	1,625	+9
Sewer	906	882	900	+2
Water	561	605	725	+20
Public service enterprises	551	649	700	+8
Conservation and development	1,127	1,221	1,300	+6
All other public	229	238	325	+37

<sup>\*</sup>BDSA mid-year estimate.

Source: Business and Defense Services Adm., U. S. Dept. of Commerce.

lion decline in residential construction in 1960.

During the first six months of this year, new construction activity was struggling along at about the same rate as during the first six months of last year. Then, in June and July, the pace quickened. At mid-year, Dept. of Commerce revised its forecast of construction activity to reflect emerging new trends. Their forecast is for a new record high of \$57.8 billion for the year, up 4% from 1960. The detailed forecast, showing trends for each type of construction, are shown in the table "1961 Outlook for New Construction."

Private expenditures for housing in 1961 are expected to be slightly lower (3%) than in 1960. But small increases in other types of private construction are expected to more than offset the reduced housing ex-

#### BACKLOG OF PROPOSED ENGINEERING CONSTRUCTION

(Thousands of dollars)

#### Private Projects

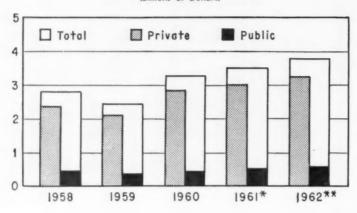
rnvare rrojects		
Type of Construction	Backlog*	% of Total
Bridges	100,862	0.1
Industrial buildings	17,449,955	13.9
Commercial buildings	28,293,047	22.6
Unclassified	10,762,582	8.6
Total private projects	56,606,446	45.2
Public Works Projects		
Waterworks	3,127,830	2.5
Sewerage	4,267,546	3.4
Bridges	3,244,271	2.6
Earthwork, irrigation, drainage	11,985,689	9.6
Streets and roads	13,283,740	10.6
Buildings	22,818,224	18.3
Unclassified	9,773,699	7.8
Total public works projects	68,500,999	54.8
Total backlog (private and public)	125, 107, 445	100.0
Federal Government work, included in public works	12 940 224	11.1
projects	13,849,324	11.1
AF 11 1. 1 C	4.4	

<sup>\*</sup>For United States, including Alaska and Hawaii, as of June 30, 1961 Source: Engineering News-Record.

#### SEVENTH ANNUAL STATISTICAL SUMMARY

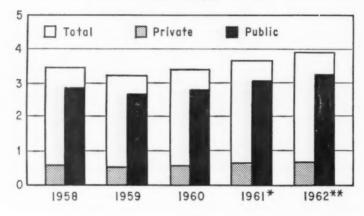
#### INDUSTRIAL CONSTRUCTION

(Billions of Dollars)



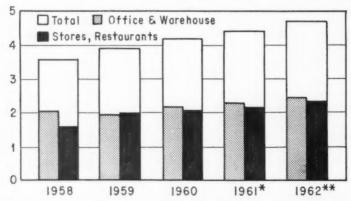
#### SCHOOL CONSTRUCTION

(Billions of Dollars)



#### PRIVATE COMMERCIAL CONSTRUCTION

(Billions of Dollars)



\* BDSA estimate, mid-1961.

\*\* EC&M estimate, mid-1961. Source: Dept. of Commerce. total private construction is only 2%, but the expenditures involved will represent a new peak of \$40.3 billion. The forecast for public construction is for a healthy 10% gain over the 1960 total.

Expenditures for nonresidential

penditures. The over-all gain for

Expenditures for nonresidential types of private construction show moderate gains generally for most categories. Gains are particularly strong for hospitals, educational buildings, and gas utilities. Industrial expenditures, up 5% in 1961 compared with a 35% increase in 1960, reflect mainly a very large carryover of activity from projects started in 1960.

Public construction, forecast at \$17.5 billion in 1961, shows strength in every category except hospital construction, which is holding at the 1960 level. Highways, at a \$5.9 billion total, account for more than one-third of the public spending total. Military construction, at \$1.6 billion, will be higher than at any time since 1943, and reflects work on the missile base program. The office building program of the Federal Government continues to be a major factor in the boom foreseen in the administrative and service building category. Public industrial buildings and water facilities are also showing strong upward trends.

Except for a 11% decline in 1959, industrial construction is continuing its rapid climb—up a total of 25% in four years (1958-61). It is expected that this rate of increase will maintain through 1962, bolstered by new construction for more production capacity as production climbs during the coming months.

Public school construction will total over \$3 billion this year, for a record, and continuing a surge that began two years ago. Total expenditures for both public and private schools are expected to reach a record \$3.9 billion in 1962, reflecting an annual growth rate of over 5%, or considerably more than the national economy growth rate over the same period.

Private expenditures for commercial construction, an area of high percentage for electrical construction in relation to total construction costs, are also expected to set new records this year, and to expand still further in 1962.

Private and public housing starts in 1961 are expected to total 1,325,-000, or about 4% more than in 1960. Of this total, 1,275,000 will be of the privately-financed type,

an increase of 37,000 over 1960. But the dollar outlays will probably be somewhat lower, mainly because of the delay in the upward turn in housing, and the increasing trend towards apartment-house construction, which involves lower prices per unit. Outlays for public residential building is expected to total \$800 million in 1961, a 12% gain over 1960. Public housing expenditures should expand even more in 1962, based on recent estimates of the Public Housing Administration.

#### **Electric Utility Industry**

The nation's electric power industry will reach new highs in output and generating capability in 1961, based on the latest semi-annual Electric Power Survey of EEI.

#### **NEW HOUSING STARTS**

(Thousands of Units)

Year	No. of Starts
1958	 1,209
1959*	
1960	
1961	1,325
1960—July	 1,182
Aug	 1,292
—Sept	 1,062
-Oct	 1,236
-Nov	1,216
—Dec	979
1961-Jan	1,105
—Feb	1,184
Mar	1,317
—Apr	1,233
May	1,220
—June	1,374

\*New series, includes Alaska and Hawaii.

Seasonally adjusted annual rate.

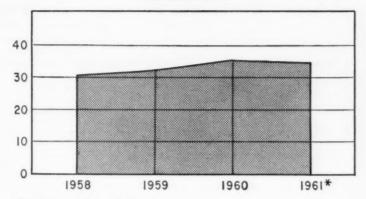
Source: Census Bureau, Dept. of Commerce.

#### Output for the total electric utility industry in the United States (not including Alaska and Hawaii) is expected to reach 819 billion kwhr by the end of 1961-an increase of 7% over the 1960 output of 765 billion kwhr. Output will climb to more than one trillion kwhr by the end of 1964, the EEI study indicates.

The scheduled increase in generating capability during 1961 will bring the total power-producing capability of the industry to 188 million kw in December, 1961, or an increase of 7.4% above the actual capability in December 1960. By the end of 1964, capability is expected to reach 221 million kw, which represents an average annual increase

#### CAPITAL SPENDING BY BUSINESS

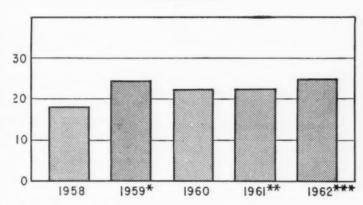
(For New Plant and Equipment) (Billions of Dollars)



\* SEC-Commerce Dept. estimate. Source: Commerce Dept. and Securities and Exchange Commission.

#### GROWTH OF RESIDENTIAL CONSTRUCTION

(Billions of Dollars)



\* New series includes Alaska and Hawaii.
\*\* Mid-1961 estimate, BDSA, Dept. of Commerce.

\*\*\* EC&M estimate, mid-1961.

Source: Dept. of Commerce.

of 6.2% for the five-year period from December 1959. For the 16year period from the end of 1948 to the end of 1964, the average annual increase in capability is 8.8%.

Total annual revenue of the electric power industry in 1961 will be in excess of \$13 billion, which constitutes its sales to about 60 million customers.

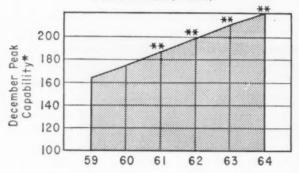
A major factor in the continuing growth of the electrical industry as a whole has been the foresight of the electrical utility industry to make long-range plans for adequate generating capability to meet the electric power needs of the nation. Not only is electric power available for today's needs-in mines, factories, commercial establishments, institutional buildings, in homes, for recreation, for streets and highways, etc.-but also for the nation's needs for tomorrow, and for the years ahead. Thus the manufacturers of electric utilization devices-motors, appliances, lighting equipment, electronic devices, air conditioners, electric space heating equipment, welders, etc.-are continuously assured of ample electric power for their products in any geographic location throughout the country.

Included in electric power generating capacity expansion is atomic electric power development. Already in operation are six atomic power plants, having a combined nominal rating of nearly 400,000

#### SEVENTH ANNUAL STATISTICAL SUMMARY

#### ELECTRIC POWER SUPPLY IN U.S.

(Total Electric Utility Industry)



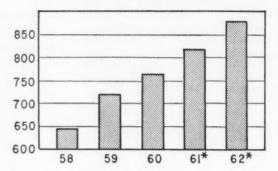
\* Millions of kw

\*\* Actual for 1959-60, estimated for

1961-64 based on semi-annual Electric Power Survey by EEI. Source: Edison Electric Institute.

#### **ELECTRIC POWER PRODUCTION**

(Billions of kwhr generated in U.S.)



\* Forecasts by Edison Electric Institute.

Source: Edison Electric Institute.

kw; and during 1961 five additional plants with a combined nominal rating of about 330,000 kw are expected to go into operation. Also, there are ten other plants under construction, design or contract negotiation with a combined nominal rating of about 500,000 kw. and three more projects with combined nominal ratings of nearly 1,000,000 kw are in the planning stage.

In addition to the 24 projects referred to above, a large number of power systems are participating in nine other atomic research, development, and study projects which will undoubtedly lead to the construction of more reactors for electric power production. Also, one large manufacturer of electrical machinery and equipment has announced the availability of "package" atomic power plants.

With the tremendous capital investment which is required per kw of installed capability it is interesting to note that the cost per kwhr continues to drop, year by year (see table "Electric Energy for Residential Customers").

#### The Lighting Industry

Lighting industry growth is, in general, paralleling that of electrical construction growth, except at a slightly higher annual growth rate. The industry comprises manufacturers of electric light sources, lighting equipment, and lighting equipment accessories-such as ballasts, lampholders, louvers and dif-

#### **ELECTRIC ENERGY SALES**

#### **Total Sales** (Millions (Billions Total Ultimate of of Year Dollars) kwhr) Customers 1958 9,734 569.2 56.208.491 1959 10.573 626.7 57,504,761 1960 11.516 683.2 58,869,766

Source: Edison Electric Institute.

#### **ELECTRIC ENERGY FOR** RESIDENTIAL CUSTOMERS

Year	Kwhr*	Total Cost*	Cost/ kwhr*
1956	2,969	\$77.19	2.60¢
1957	3,174	81.25	2.56
1958	3,366	85.16	2.53
1959	3,585	89.63	2.50
1960	3,827	94.53	2.47

\*Annual averages.

Source: Edison Electric Institute.

#### SALES OF ELECTRIC LIGHT SOURCES

(Used for General Lighting)

	Incandescent		Fluorescent		Total
Year	Units*	Retail Value†	Units*	Retail Value†	Retail Value
1956	1,101	325	109	175	500
1957	1,092	355	109	180	535
1958	1,091	353	109	188	541
1959	1,146	434	127	229	663
1960	1,100	450	133	241	691

\*Millions of lamps.

†Millions of dollars.

Source: Census Bureau, Dept. of Commerce.

fusers, etc.—from the standpoint of production. The industry may also be assumed to include the specifiers, sellers and installers, in its broadest

The key element in electric lighting is the electric lamp, or light source. The major dollar volume, as well as number of lamps, continues to be for incandescent lamps (see table "Sales of Electric Light Sources"). In second place, and growing rapidly, is the fluorescent lamp. These two types of lamps only now have a combined annual retail value in excess of \$700 million in 1961. In the five-year period from 1956 through 1960, sales of these two light sources only increased 38.5% for an average annual increase of about 7%.

Other light sources include mercury vapor, and electroluminescent. Mercury vapor lamp sales now total over \$15 million annually at retail value, and this lamp is continuing to grow in popularity-for street and highway lighting, floodlighting, and large-area industrial areas. Electroluminescent applications are limited to areas where low brightness lamps are applicable, but more and more uses are being found for such lamps.

Lighting equipment sales continue to expand, aided by several interacting factors. The basic market for lighting equipment sales is inherent in two sources-new construction, and modernization, or relighting. As has already been noted. new construction work has again turned upward, following a slight decline in 1960. Modernization work, however, and especially relighting, is not moving ahead as rapidly as in previous years. There is a tremendous market for relighting, which has been analyzed in reports over the past few years, and is now estimated at some \$7.5 billion for lighting equipment only. However, some architects and engineers are now making studies in depth of the economics of modernization versus new building construction. This would seem to indicate that there may be a developing trend to try to influence owners to tear down their old structures and build new ones rather than to invest in modernization of the old structure. Notwithstanding this possible trend, the fact remains that many thousands of old buildings exist which are underlighted, and will continue to be occupied. Thus these constitute a tremendous market for relighting. It is a market which must be developed and sold, and it is believed that this is a job that could most effectively be done through a cooperative promotional campaign sponsored by the entire electrical industry.

Total lighting sales for 1961 are estimated at about \$580 million (see table "1961 Lighting Equipment Dollar Volume"). If new construction estimates for 1961 are met, the lighting dollar volume for 1962 should increase to about \$620

#### 1961 LIGHTING EQUIPMENT DOLLAR VOLUME

(Used for General Lighting Purposes) (Thousands of Dollars)

(modulus of Dollars)	
Type of Construction Where Used	Value**
Total New Construction	\$524,716
Private Construction	371,461
Residential (nonfarm)	123,750
Nonresidential buildings (nonfarm)	217,980
Industrial	61,740
Offices, warehouses and loft buildings	56,250
Stores, restaurants and garages	49,450
Other nonresidential buildings	50,540
Religious	19,987
Educational	10,764
Hospital and institutional	13,227
Social and recreational	4,687
Miscellaneous	1,875
Farm construction	3,185
Public utilities	25,871
Telephone and telegraph	14,534
Other public utilities	11,337
All other private	675
Public Construction	153,255
Residential building	2,400
Nonresidential building	87,950
Industrial	7,650
Educational	52,307
Hospital and institutional	7,000
Administrative and service buildings	14,423
Other nonresidential building	6,570
Military facilities	4,760
Sewer and water systems	2,445
Public service enterprises	2,240
Conservation and development	650
Highways (includes street lighting)	52,000
All other public	810
Modernization (relighting)	55,000
Total Lighting	579,716
Total Lighting	

\*Does not include searchlights, automotive, aircraft or railway coach lighting, residential portable lamps, and similar types of lighting equipment not associated with building construction.

\*\*Based on manufacturers' selling prices. EC&M estimate, mid-1961, based on Dept. of Commerce

forecast for 1961 new construction at mid-1961.

#### LIGHTING EQUIPMENT VOLUME-1954 AND 1958

(Used for General Lighting, By Types) (Thousands of Dollars)

SIC		Value* of Products Shipped	
Code	Type of Lighting Equipment	1954	1958
36421	Residential fixtures (excluding portable lamps)	89,312	117,992
36422	Commercial and institutional fixtures (excluding		
	portable lamps)	114,283	165,472
36423	Industrial fixtures	62,393	60,457
36425	Floodlighting and area lighting equipment †	52,047	76,308
	Total value, general lighting equipment	318,035	420,229

\*Manufacturers' selling prices

†Does not include traffic signals, or mercury vapor ballasts.

Source: Census Bureau, Dept. of Commerce.

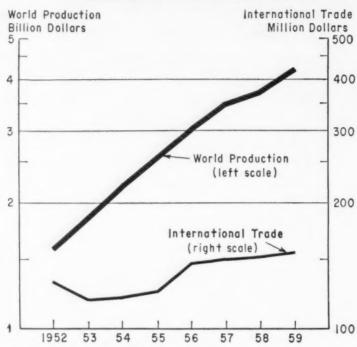
million-more, if relighting is successfully promoted.

The total lighting market subdivides into six basic types, classified according to end-use. It is estimated that the \$580-million market estimated for 1961 breaks down into these six classifications about as follows, for both new construction and modernization, or relight-

Residential lighting-\$141 million. Included in this classification is commercial lighting equipment

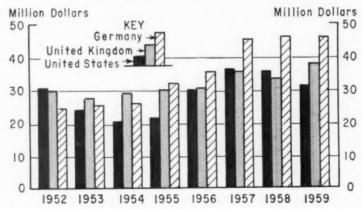
#### SEVENTH ANNUAL STATISTICAL SUMMARY

#### WORLD PRODUCTION AND INTERNATIONAL TRADE OF ELECTRIC MOTORS 1952-59



Source: Electrical Equipment Div., BDSA, Dept. of Commerce.

#### EXPORTS OF ELECTRIC MOTORS BY LEADING WORLD SUPPLIERS 1952-59



Source: Electrical Equipment Div., BDSA, Dept. of Commerce.

such as fluorescent strip lighting, used for cornice and valance lighting, and incandescent downlights and lens units, etc., used for utilitarian and dramatic lighting effects in homes.

Industrial lighting—\$80 million. Included in this category is also commercial lighting equipment, such as troffers and luminous ceilings which are used for many production areas in industry.

Commercial lighting—\$160 million. This classification also includes such equipment as industrial reflectors, ornamental residential luminaires (as in a restaurant), floodlights and spotlights, etc.

Institutional lighting—\$132 million. Included in this classification

is much custom-built equipment, both utilitarian and decorative, and in general the mass quantity is identical to the "commercial" classified equipment.

Street and highway lighting— \$52 million. This is standard street lighting luminaries of all types mercury vapor, fluorescent, incandescent—and also includes poles, brackets, newels, etc.

All other lighting—\$15 million. This covers lighting equipment and end-use applications that are not covered in the above five classifications.

The dollar volumes indicated above are estimates, based on new construction estimates and modernization work for 1961, and assume continuing and effective industry promotion of the current IES lighting recommendations for quantity and quality as adopted in 1958.

World production of electric motors has risen sharply in recent years. Value of output in 1959 was an estimated \$4.2 billion, almost triple the 1952 output of \$1.6 billion, according to a recent Dept. of Commerce study and report. This is a rate of increase averaging 18% a year

International trade in electric motors during this period lagged far behind production (see Chart). The percentage of world output entering international trade channels dropped from 8.4% in 1952 to an estimated 3.6% in 1959.

The United States, the United Kingdom, and West Germany combined account for an estimated 75% of total world exports.

Increasing world competition has resulted in a shift in the relative positions of the three major world suppliers (see Chart). In 1952, the U.S. supplied more than 50% of the export market, and by 1959 this had dropped to about 23%.

This example is presented to show that the U.S. electrical industry is now in a world market, and must take this into account—first, for expansion of its markets through export; and second, from a competitive standpoint in supplying our domestic needs.

One approach of U.S. firms to meet this situation is the investment in new plant and equipment in other countries, by many U.S. companies. Such investments this year will total \$4.5 billion, up more than 20% from 1960, according to a Dept. of Commerce estimate.

# Planning an Industrial Electrical System

Electrical design and installation techniques selected for the new Bausch & Lomb eyeglass-frame plant at Chili, N. Y.

By A. A. Tseng, Electrical Engineer, Stone & Webster Engineering Corp., Boston, Mass.

WELL-DESIGNED electrical installation largely depends on a full understanding of the present and future needs of each particular plant. Moreover, industry data, concerning the products manufactured, serve as a barometer for the expected growth of business and plant facilities.

In the case of an eyeglass-frame plant, industry statistics indicate that one in every four persons in this country wears eyeglasses, and a one-to-three ratio is reached when sunglasses are included. These facts represent a substantial part of the business of Bausch & Lomb, Inc., Rochester, N. Y.

Stone and Webster has recently completed Bausch & Lomb's new eyeglass-frame plant, located at Chili, N. Y. Products that will be manufactured in this 250,000 sq ft plant include spectacle frames for Bausch & Lomb sunglasses, dress and industrial eyewear frames, and all types of eyeglass frames.

The life of an industrial enterprise depends on its margin of profit per year. To attain maximum profits, economic conditions must be closely observed during initial plant layout. Furthermore, the plant design must conform to safety codes. And the plant design must be completed on schedule and at minimum cost to lower capital charge-offs; yet it should be flexible enough to permit quick layout changes needed for new products.

This article describes how electrical facilities have provided economical, safe and flexible layouts to meet the unusual requirements at the new Bausch & Lomb plant.

#### Problem and Solution

The plant layout consists of 12 production areas and a large ware-

house, which also serves as a distribution center. Production and distribution areas are in a window-less 510-ft by 400-ft building, with a ceiling height of 20 ft and truss clearance of 16 ft. Attached to the production building are extensive

office facilities, a steam plant, locker rooms, loading and shipping docks, and a cafeteria with a 400-seat capacity.

To provide adequate illumination for approximately 1000 employees in a windowless plant covering

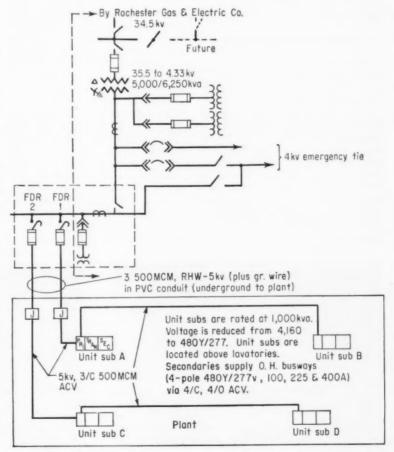


FIG. 1—One-line diagram shows basic power distribution. Two gang-operated, fused load-break switches, installed in an outdoor cubicle, provide 4160-volt primary supply to four 1000-kva unit substations in the plant. Underground cables are rated at 5 kv and are installed underground in PVC conduit to plant. Primary wiring in the plant extends to unit subs via exposed ACV steel, interlocked armored cable. Over 18,000 ft of plug-in busway is supplied from the four substations in the plant.

nearly five acres required an average lighting intensity of 75 fc for working areas, and intensities up to 300 fc for special needs.

Field surveys and studies were made with Bausch & Lomb staff engineers to determine the load factor for the new plant, based on data from existing plants and the planned production schedules. There are about 1000 440-volt motors and furnaces and 1200 110-volt electrical devices connected to the electrical system, with a total connected power and lighting load of 5500 km.

Locating each of four 1000-kva substations above a lavatory satisfied several objectives. Substations would be nearer load centers; production areas would be clear; overhead steel supports would be kept to a minimum; and feeders to 18,000 ft of plug-in busways could also be kept overhead with minimum interference.

#### **Early Equipment Orders**

Time was critical not only because of the April 1961 completion date, but because the power equipment had to be delivered by November 1960 to supply the light and boiler heating load during winter construction. The construction schedule and budget did not provide for temporary work. Consequently, plans were accelerated so that, by early August, orders were being made for long-delivery items such as transformers, switchgear, and larger secondary distribution equipment.



WORKING FROM SCAFFOLD, electrician attaches 3-pole 50-amp busway to roller hangers. Welded studs secure hangers at 5-ft intervals. Airplane messenger wire, seen to right of busway section, provides side-tension control.

Pre-engineered power equipment packages have many advantages. They are easy to order and require only one specification for the complete power package. Moreover, there is no need to order bits and pieces from a number of suppliers, and paper work is kept to an absolute minimum. Units are completely assembled, pre-tested before delivery, and are easy to install. As a result, equipment is moved into place, the incoming and outgoing lines are connected, and the system is ready for operation.

The following "basic building blocks" were ordered, based on their merits and expected construction savings resulting in part from sound engineering practices:

1. An outdoor 4160-volt power switching center that connects di-

rectly to the adjacent metering and switching cubicles purchased by the local power company. Each cubicle contains a gang-operated, fused, load-breaking switch.

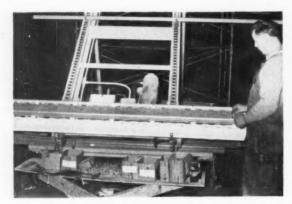
2. Four 1000-kva industrial-type power-center units. Each unit is an integrally packaged substation, consisting of a transformer with a 4160-volt primary and seven secondary switches. These units are designed for installation close to or within a load area. Kilowatt demand recorders are provided to record and measure various department peak demands for production and scheduling purposes.

3. Interlocked, armored, galvanized steel, varnished-cambric cables on standard aluminum ladder trays for indoor portions. It was noted that only this type of cable bears the UL label, and the local inspectors were consulted to insure approval of this type of installation.

4. Factory pre-cast concrete manholes and handholes for underground cable installation.

5. Twenty- to 30-ft-long plastic conduits with end couplings for underground installation. Considerable labor and time were saved by using directly buried conduits. Records indicate 2000 ft of 3-in. and 4-in. conduits can be installed in 24 man-hours.

6. New "one-bolt," 3-phase, 4-wire, plug-in 480-volt busways throughout all production areas. Proper selection of standard lengths and fittings was made to fit the production layouts. The entire 480-volt busway system was assembled 17 ft above ground by a five-



FIXTURES AND BUSWAYS were prepared at ground level, then raised to rolling platform by using a pushbutton-controlled conveyor-type hoist. This method reduced labor costs and cut installation time for fixtures and busways. The entire 480-volt overhead busway system was installed by a 5-man team at a rate of 200 to 240 ft per day.



TWO ELECTRICIANS for Horacek-Hayden Inc., Rochester, N. Y., receive 8-ft fluorescent fixture from motorized conveyor. As each fixture is installed and connected, another unit is readied into position on the conveyor by a mechanic at ground level. Scaffolds and conveyor are both provided with casters so equipment can be readily moved.



**LIGHTING SYSTEM** was installed and energized in early construction stages. Here workmen are in process of pouring concrete floor slab under ideal lighting conditions. This procedure eliminated the need of extensive temporary lighting found on most jobs.



COMPLETE INSTALLATION of fluorescent fixtures and busway is shown. Fixtures plug into 277/120-volt 3-pole 50-amp busway. In the top part of photo, the mechanically held contactor (shown in Fig. 2) plugs into 480Y/277-volt 4-pole power busway. Interlocked armored cables extend into control panel.

man team at a rate of 200 to 240 ft per day.

Fig. 1 shows a one-line diagram of the plant power distribution system.

Accompanying photos show the general lighting arrangement, which provides an average lighting intensity of 75 fc. In general, the

plant is illuminated by 277-volt, 8-ft Power-Groove fluorescent lamps with intermediate 120-volt, 40-watt, rapid-start fluorescent night lights which cannot be switched locally.

Fig. 2 indicates typical control arrangements and lighting distribution used throughout the plant. At each end of the 3-phase, 3-row fluorescent fixtures, there is one pushbutton station. These stations have been located for convenient control of plant lighting by security and supervisory personnel. They provide the momentary current required to energize either the "on" or the "off" coils of the mechanically held contactors plugged along the 480-volt plug-in buses. No power is wasted by keeping the contact closed.

Supplementary lighting is furnished by 40-watt fluorescent strip lights over quick-pick racks and standard shelves in the warehouse area so that small print on the products can be easily read by personnel.

Throughout the warehouse area, 277-volt, 8-ft Power-Groove fluorescent lamps with intermediate 120-volt, 40-watt rapid-start fluorescent night lights, as shown on Fig. 2, provide an average lighting intensity of 30 fc.

The following proposals were selected for cost comparisons.

1. Use of conventional wire and conduit for supplying the very-high-output fluorescent fixtures fed from conventional 208Y/120-volt lighting transformers, and lighting cabinets with necessary 120-volt outlets at 5-ft intervals to supply miscellaneous power.

2. Use of factory prefabricated wiring troughs for support of 277-volt lighting fixtures with separate transformers for 120-volt outlets at 5 ft intervals.

3. Use of a 277/120-volt, 3-wire busway system as shown on Fig. 2. (Continued on page 223)

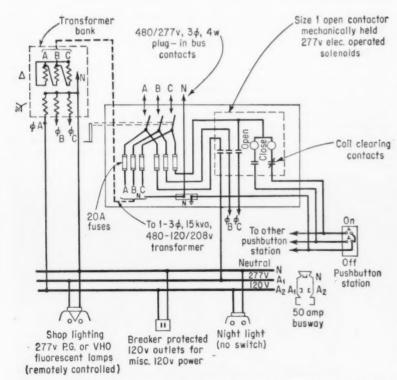


FIG. 2—Unique control arrangement operates 277-volt shop lighting in the new Bausch & Lomb plant. Note that typical runs of 3-pole 50-amp busway provide circuits for both 120- and 277-volt circuits. Each 15-kva dry-type transformer provides 120-volt power for three 50-amp busways.

How to plan . . .

# Outdoor Substation Maintenance

Practical, step-by-step inspections of substation equipment are the key to trouble-free operation and uninterrupted service.

By Robert J. Lawrie

F PROPER maintenance of an outdoor substation is neglected, even the most extensive in-plant electrical preventive maintenance program would be for naught. Because substation equipment is ruggedly built and can operate for several years with only a minimum of maintenance, some engineers tend to take this equipment for granted. And, sooner or later due to the lack of proper maintenance, some component will fail, very likely causing extensive damage and a lengthy downtime.

Yet effective maintenance of an outdoor substation, which would insure its reliability, is easily accomplished after careful study and planning.

One of the first considerations is the question, "Who is qualified to inspect and perform maintenance on the outdoor substation"? After the inspection procedures set forth in this article have been reviewed, it will be evident that an alert plant electrician can perform substation inspections. However, actual work performed in the substation, including routine preventive maintenance, should be accomplished by trained high-voltage electricians. If none is available within the company, a reputable substation maintenance contractor should be called

Effective substation maintenance can be planned in three interrelated

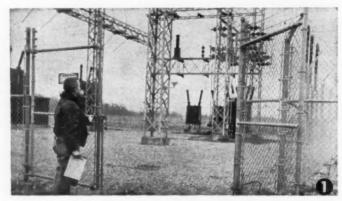
phases. They are: (1) inspections, (2) records, (3) routine preventive maintenance procedures.

This article deals mainly with the inspection phase, using, as an example, an outdoor substation located at Special Metals Inc., New Hartford, N. Y., as a guide. As inspection procedures are being planned and written for a specific outdoor substation, the number and kind of records required will become evident. Routine preventive maintenance procedures will be discussed briefly later on.

Some engineers feel that a daily inspection of this all-important

equipment is necessary. And, if it is at all possible, daily inspection is highly recommended. But frequency of inspection depends on the complexity, type and age of the equipment as well as the prevailing weather conditions. Many engineers feel that a weekly inspection is minimum, with the reservation that the substation be shut down at least once a year and given a thorough testing and inspection.

When planning inspection procedures, consult the manufacturer of the station equipment to be sure all details are covered. Or consult the local power company. In many



**SAFETY** is of paramount importance when inspecting the substation. Upon entering the substation, the inspector's eyes should travel from the incoming lines following conductors through switches and superstructure watching for any arcing or burning.

cases, they will gladly send an expert to assist in setting up the in-

spection schedule.

To become familiar with the substation equipment, make a one-line diagram such as the accompanying sketch. This modified one-line diagram of a typical substation contains numbers that refer to the corresponding numbered photos and to inspections outlined in text.

Because of the large variety of outdoor substation equipment manufactured, these inspection procedures may vary somewhat. However, steps may be added or deleted.

#### 1. Safety

It is impossible to overemphasize the importance of personal safety when dealing with highvoltage equipment. Upon entering the station, the inspector's eyes should travel from the incoming lines following conductors through switches and superstructure watching for any arcing or burning. Using a pair of high-powered binoculars, he can thoroughly inspect any part of the system from a safe The inspector must distance. double-check his every move when in the substation and always be alert. An inadvertent move might not only disrupt the substation and plant but also may endanger his life.

#### 2. Lightning Arrestors

a. Look for cracked insulators, dirt or foreign material and loose connections.

b. Be sure ground connections are tight (if accessible).

#### 3. OCB Isolating Switch

a. Look for cracked insulators, dirt or foreign material, loose connections and oxidation at the switchblades.

b. Clean any dirt or foreign ma-

terial from switch-operating mechanisms. (Because all substation isolating switches cannot be operated while carrying current, these switches should be padlocked

c. Be sure operating-mechanism parts are tight.

#### 4. Oil Circuit Breaker (OCB)

a. Look for cracked insulators, dirt or foreign material and loose connections

b. Be sure ground connections are tight.

c. Record bushing oil levels (six). d. Record tank oil levels (three).

e. Record air-reservoir pressure. (Many OCBs are pneumatic operated.)

f. Look for possible air leaks.

g. Make a visual inspection of control-cab wiring and air-compressor motor. (Lubrication schedule for this motor can be placed inside control cab.)

h. Look for any oil leaks (at gasketed manhole covers or oil

valves).

i. Watch for excessive corrosion or rust.

j. Every six or twelve months, take oil samples from each tank. (Oil samples may be sent to a testing laboratory for testing of moisture content, dielectric strength and sludging.)

#### 5. Superstructure, Overhead Conductors and Station Housekeeping

a. Look for any foreign material in superstructure, such as bird nests or ice. Also look for cracked insulators, dirt or loose connections.

b. Be sure superstructure ground connections are tight.

c. Check all substation floodlight-

d. Be sure that the substation is clean. Remove any oil barrels or discarded material lying on the ground. (Substation grounds should be covered with a layer of gravel: if weeds are growing, they should be killed with chemicals.)

#### 6. Transformer Primary Isolating Switch

a. Look for cracked insulators, dirt, or foreign material and loose connections.

b. Clean any dirt or foreign material from switch-operating mech-

c. Be sure operating mechanism parts are tight.

#### 7. Power Transformer

a. Look for cracked insulators. dirt or foreign material, and loose connections

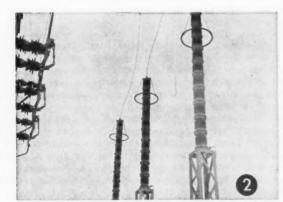
b. Be sure ground connections are tight.

c. Record transformer tank oil

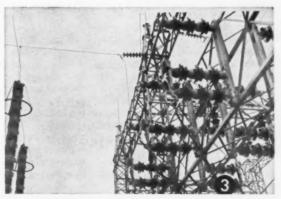
d. Record bushing oil levels (3) or (6).

e. Record oil and winding temperatures.

f. Record pressure-vacuum gage reading.



LIGHTNING ARRESTORS protect substation equipment from transient voltage surges caused by lightning discharges. Look for cracked insulators, dirt and loose connections. In many cases, lightning arrestor failures have been traced to a poor ground connection. Be sure ground connections are tight.



OCB ISOLATING SWITCHES cannot be operated under load. These switches should be padlocked closed. Look for oxidation at the switchblades as well as cracked insulators and loose connections. High-voltage rubber gloves should be worn if this switch must be operated.

g. Check pressure-relief diaphragm (if accessible).

h. Check for oil leaks (at gaskets and oil valves).

Inspect cooling fans (when used).

 Every six or twelve months take oil samples.

#### 8. Outdoor Metalclad Switchgear (Panel Side)

Cubicle No. 1-Main air-circuitbreaker control and metering.

a. Look for dirt and foreign material, loose or burned control wiring and excessive rust or corrosion.

 b. Check cubicle illumination, signal lamps and cubicle strip heaters.

c. Record meter readings.

Cubicles No. 2, 4, 5, 6, 7—Circuit breaker control and metering.

(Repeat inspection as described for cubicle No. 1.)

Cubicle No. 3—Battery charging equipment.

(Repeat inspection as described for cubicle No. 1) plus: Check charging current. (As the rectifier ages, the control rheostat must be adjusted to maintain proper charge-current value.)

#### 9. Outdoor Metalclad Switchgear (Circuit-breaker Side)

Cubicle No. 1-Main air circuit breaker and control wiring.

a. Look for dirt and foreign material, loose or burned control wiring and excessive rust or corrosion.

b. Look for any indication of arcing (burning odors or flashing).

Cubicle No. 2-Metering transformer compartment.

(Perform inspection as described for Cubicle No. 1.) Caution—It may be dangerous to open this compartment. Before inspecting this compartment, consult the manufacturer or a high-voltage expert to be certain that all safety interlocks are installed.

Cubicle No. 3—Storage batteries for CB auxiliary trip power.

a. Look for dirt and foreign material, loose or burned control wiring and excessive rust or corrosion.

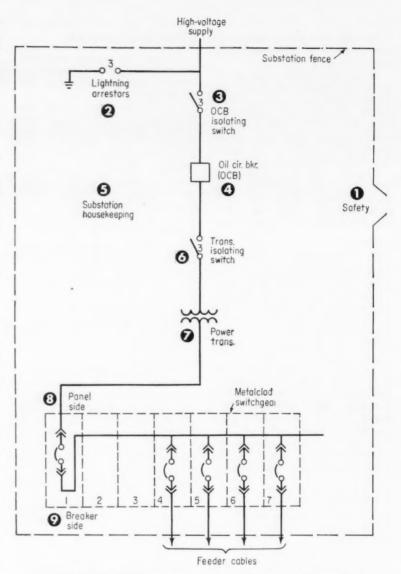
b. Select a cell as a pilot. Record temperature and specific gravity of this pilot cell.

c. Once a month record temperature and specific gravity of each cell.

d. Check battery water level.
 Cubicles No. 4, 5, 6 & 7—Feeder

Cubicles No. 4, 5, 6 & 7—Feeder circuit breakers.

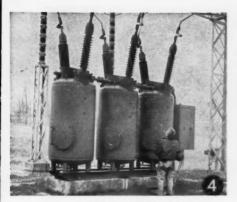
(Perform inspection as described for cubicle No. 1.)



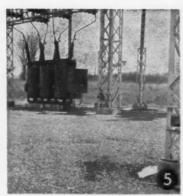
**TYPICAL SUBSTATION** layout is shown in a modified one-line diagram. On the diagram, numbers refer to the inspection procedures outlined in the text and to the corresponding numbered photos. These inspections can be performed by an alert plant electrician.

While inspecting the substation, the electrician may spot a loose connection or excessive corrosion. In addition, routine preventive maintenance procedures must be performed. Who qualifies to accomplish these procedures? In some companies, engineers assign this work to plant electrical men. These engineers know how to shut down their substation safely and know how to prepare the substation for maintenance. And, because of the unique characteristics of high-voltage apparatus, they have made certain that the selected men are well trained and fully qualified to perform substation maintenance.

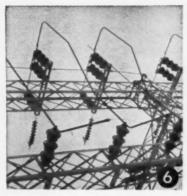
On the other hand, other engineers have found that calling in an outside contractor is the most efficient and economical way to maintain the substation. Main advantages gained in subcontracting substation maintenance are: (1) In many instances it is cheaper. Plants that hire trained high-voltage electricians usually find that they command a high wage. In some areas certain ordinances require that not less than two men perform this work, further increasing costs. Also, an inefficient situation occurs when substation maintenance is not extensive enough to keep these men busy; (2) Assurance that the ex-



**OIL CIRCUIT BREAKER** (OCB) requires extensive inspection for proper maintenance. Here, a plant electrician takes bushing oil-level readings. He'll also record tank oil levels and the air reservoir pressure and look for oil leaks and excessive corrosion.



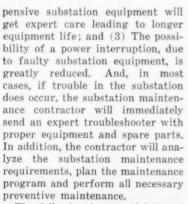
SUPERSTRUCTURE, overhead conductors and station area receive a thorough visual inspection. Look for foreign material such as bird nests or ice in the superstructure. Substation floodlamps should be tested. Substation area should be kept clean; kill weeds with chemicals.



TRANSFORMER ISOLATING switch is three pole, group operated with horngaps. Look for cracked insulators and loose connections. Clean and lubricate operating mechanism at intervals. Any oxidation at the switchblades should be removed at the maintenance shutdown.



**POWER TRANSFORMER**, rated 3750 kva, 115 kv/13.2 kv, is being inspected by plant electrician. Transformer-tank oil level and temperature, bushing oil levels, and pressure-vacuum gage readings should be recorded for future reference and comparison.



The following is a partial list of routine preventive maintenance



**OUTDOOR SWITCHGEAR** inspection (panel side) includes recording meter readings, and checking cubicle illumination, signal lamps and strip heaters. Here, a plant electrician makes a visual inspection for excessive rust or corrosion and loose or burned control wiring.

procedures for the outdoor substa-

1. Safety—check all ground conductors; measure resistance of ground circuit. Check substation fence, gate locks, high-voltage signs and safety interlocks.

2. Tighten all superstructure bolts, high-voltage cable connections and busbars.

3. Tighten transformer, OCB, and air-circuit-breaker fittings.

4. Test oil samples with portable tester.

5. Make insulation - resistance tests on high-voltage cable and buses. Make power-factor tests on transformer and OCB bushings and



**OUTDOOR SWITCHGEAR** (CB side) inspection is similar to the panelside inspection. In addition, the plant electrician checks for any indication of arcing (burning odors or flashing). The number of breaker operations is automatically tallied on front of the breaker.

on isolating-switch insulators.

 Test all relays and control circuits for the OCB, transformers and components in the metalclad switchgear.

Inspect, clean and adjust isolating switches and operating mechanisms,

8. Check OCB contact resistance with a "Ductor" or similar device. Inspect interior of OCB and perform pertinent tests.

9. Inspect interior of transformers and perform pertinent tests.

10. Inspect and test air circuit breakers. Perform timing and travel tests, contact inspection and lubrication.



**RAPID TRANSITION** from brilliant outdoor illumination to darkness of tunnel would result in momentary blindness to the motorists while waiting for eyes to dilate sufficiently to adopt to poorer seeing conditions. Relay control panels are well-recessed beneath arrow.

#### **Tunnel Lighting**

High-output fluorescent lamps, with cycling controlled by photocells and astronomic clock auxiliaries, are installed in highway tunnel to produce 50 footcandles of portal intensity. Installation of this, plus mercury-vapor approach system, was by Newbery Electric.

By H. Stead, Traffic Supervisor, Arizona Highway Dept.

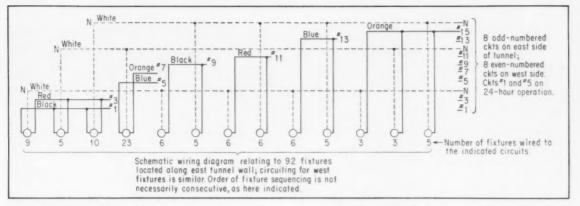


**FAST EMERGENCE** from dark tunnel to bright sunlight would create adaptation problem in reverse. Both conditions point to importance of high-level artificial illumination just inside portals, although intensities may be gradually lessened as motorists proceed inward toward center of tunnel and pupils of eyes have time to dilate to compensate for reduced lighting values.

RIZONA'S legendary sunshine, as that State's Chamber of Commerce will gladly point out, offers a brilliant solution for weather-weary tourists seeking a pleasant winter haven.

It does, however, also create occasional problems. As, for example, in the design of tunnel lighting—where higher outdoor footcandles accentuate the relative darkness of tunnel portals entered at high speeds.

To illustrate, consider Mule Pass in Cochise County. Located close to the Mexican border between Tombstone and Douglas on U. S. 80, this recently completed tunnel improves safety and cuts traveling time by eliminating a hazardous section of narrow, twisting roadway across a 6000-ft mountain ridge. Extending 1400 ft in length, the tunnel has a crown-to-roadway



**DAYTIME—NIGHT-TIME** lighting intensities and circuiting arrangements are variable; requiring circuits 1, 2, 5 and 6 to be kept in operation continuously, with others switched

on or off as required. All fixtures are 2-lamp units; circuits 1 through 4 controlling only one lamp per fixture; remaining circuits controlling both lamps.

### With H. O. Lamps

clearance of 23 ft; a gradient of  $6\frac{1}{2}\%$ ; and a width of 42 ft that contains twin walkways plus three traffic lanes separated by 18-in. whistle stripes.

In designing the lighting for this tunnel, the problem of eye adaptation related to fast transition from brilliant sunlight to a relatively dark interior was fully appreciated. Analysis of tunnel accidents indicated that the first 500 ft inside portal entrances were critical areas, inasmuch as objects in paths of moving cars could not be clearly discerned unless high levels of artificial illumination were provided. As cars proceed inward and motorists' eves gradually dilate to adjust for reduced lighting levels, high portal illumination can be progressively lessened. But, when cars are entering a tunnel at speeds above 40 mph (as is the case at Mule Pass), initial portal intensities of 50 fc were considered to be minimum objectives.

#### 50-FC Portal Intensities

As actually obtained, daylight intensities for the first 150 ft inside each of these portals is 50 fc, this level dropping to 25 fc for the next 75 ft, 16 fc for the next 75 ft, and 11 fc for the central 800-ft distance. Brightness values of fixtures approximately 7½ footlamberts.

Since the tunnel carries 2-way traffic, spacing of fixtures at both

portals is symmetrical; such spacing being progressively 6½, 11 and 16 ft along each side of the tunnel for the distances noted above, then continuing at 16 ft intervals (but with fixtures staggered from side to side of the tunnel) for the remaining central section.

Fixtures are high-output 2-lamp 6-ft units; each 100-watt T-12 coolwhite rapid-start lamp provided with a separate ballast, and each 1000-ma high-power-factor ballast designed for multiple 115-volt circuiting and for minimum winter temperatures of 20 degrees below zero.

Fixtures are of all-aluminum construction, curved housings extruded, end caps cast, and polished Alzak reflectors sprung into holding grooves. When access to terminal blocks and ballasts is desired, reflectors may be quickly removed by manual squeezing.

These fixtures are also equipped with curved, ribbed, clear acrylic plastic covers; door frames sealed by neoprene gaskets, secured by separable stainless-steel hinges and spring-loaded catches, and capable of being completely detached if so desired. Lampholders are double-contact heavy-duty devices recessed into end caps; one holder being compressible to permit fast, secure relamping.

Since extreme natural-artificial lighting ratios are absent after dark, and high portal illumination

is therefore less critical, night-time circuiting provides for a lower, uniform, portal-to-portal level of approximately 6 fc with fixture brightness values averaging 2½ footlamberts. This is accomplished by using only one lamp in every fourth fixture for the first 138 ft inside each portal, one lamp in every third fixture for the next 95 ft, and only one lamp in each 2-lamp fixture for the central 800-ft section.

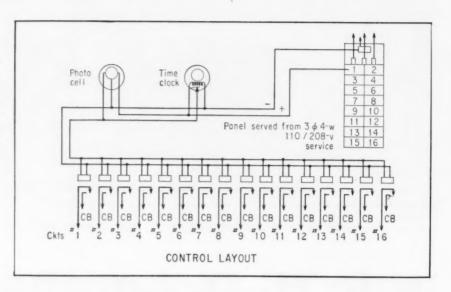
Location of fixtures reflects considered forethought, because it was deemed advisable to keep lighting units away from the tunnel's crown area, where smoke from diesel trucks would necessitate more frequent cleaning. Yet a location too close to outer walls would simultaneously lower fixtures to points where they conceivably could be struck and damaged by tall truck bodies or flapping canvas tarpaulins.

Their present location, above curb lines at heights of 14-14½ ft, is therefore conducive to greater accessibility, maintenance ease and fixture safety.

Since these mounting heights are relatively low, it then became important to select fixtures which would combine low-brightness values and minimum glare characteristics with high light output. Other desirable objectives included long lamp life and reduced energy consumption; all of these factors

#### LIGHTING CIRCUIT CONTROL

is by relay-activated breakers, cycling being regulated by operation of either photocell unit or astronomic clock. Photocell is aimed due north, while clock is synchronized with exact latitude of tunnel location. Should manual control of lighting be desired, direct switching is possible as well.



suggesting the use of high-output fluorescent lamps.

With fixture housings and ballasts weighing approximately 55 lb per 6-ft assembly, units are supported solidly by brackets, which in turn are anchored via galvanized lock washers and nuts to similarly rust-proofed studs driven into concrete walls by means of power fastening tools. And to direct maximum light downward to the roadway, fixtures are inclined downward 45 degrees from the horizontal.

#### Photocells and Relay Control

For control purposes, lamps are grouped into 16 circuits; each circuit serving approximately 24 lamps; only a fourth of these circuits being used for night-time service. Control is by masonitemounted mercury relays rated at 60 amps each and normally deenergized during daylight hours. Switching of relays is regulated by a photocell unit oriented to due north. And for auxiliary control purposes, the relay cabinet is also equipped with a manual switch plus an astronomic spring-action clock having carry-over characteristics synchronized for the exact latitude of the tunnel (31 degrees 25 minutes). Normally closed contacts of multiple relays are protected by fuses placed on coil and load sides as well, while coils are additionally protected by the existence of lightning arresters.

Wiring for lighting fixtures is carried through tunnel walls via two 2-in. galvanized rigid steel conduits, each conduit serving one side of the tunnel, that is, 92 2-lamp fixtures.

Junction boxes are installed behind each fixture location. Connections between JBs and fluorescent fixtures are by means of flexible waterproof conduit and fittings and, in cases where angle fittings attached to these flex sections do not establish solid grounding bonds, the waterproofing insulation is removed to insure that protection.

Connections within junction boxes (between No. 6 feeders and No. 12 fixture leads) are established via split-bolt copper connectors insulated by successive layers of cambric tape, plastic electric tape and compound, while connections between lead wires and ballasts within fixtures are made by splicing and soldering, then insulating with plastic and friction tape. Feeder wires are formed into 10in, slack loops in each junction box to facilitate splicing and permit subsequent reconnection and recircuiting of fixtures if desired.

#### Mercury Approach Lighting

In addition to lighting inside the tunnel proper, illumination is also provided for exterior approaches by 400-watt 20,000-lumen mercury-vapor lamps housed in OV-35 Type III distribution luminaires sup-

ported by 30-ft Type X steel poles equipped with 8-ft upsweep mast arms, and serviced through underground multiple-lamp ballasts. Flashing or pulsating 1-way amber light heads likewise are installed along approach sections, where new roadway alignments depart from the old, to warn motorists of this new construction.

In this approach-lighting installation, underground service between pullboxes is through asbestos-cement conduit, although service from pull boxes to lighting standards is via buried rigid steel conduit which is thoroughly rustproofed by grit-blast cleaning, priming coats of coal tar and coaltar enamel, spiral wrappings of asbestos felt, a recoating of coal-tar enamel, and a final wrap of Krinkle-Kraft paper. This same application also continues slightly above grade as buried conduit sweeps up at the meter loop assembly, after which uncoated galvanized rigid steel conduit continues to the service head.

Included in the meter loop assembly is an activating photocell unit, a raintight flasher and a 3-pole (solid neutral) multi-breakertype 220-volt switch.

Since large surfaces of high-reflectance natural rock surround the portals and approaches to this tunnel project, thereby increasing outside-inside brightness ratios still further, design engineers deliberately lessened exterior brightness by specifying black asphalt topping for approach roadways. And con-

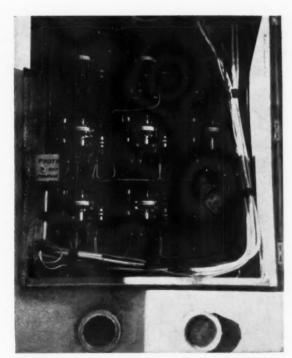


THIS TUNNEL VIEW shows symmetrical variations of lighting intensities from portals toward center of tunnel dropping progressively from 50 fc to 25 to 16 to 11 fc, then returning to 50. Symmetrical installation from either end was dictated by fact that tunnel carries 2-way traffic. This view, showing lighting arrangement for daylight hours, was taken at night in order to better illustrate the return to portal conditions at the far end of the tunnel. Actually, night-time lighting in tunnel is a fairly even 6 fc from portal to portal.

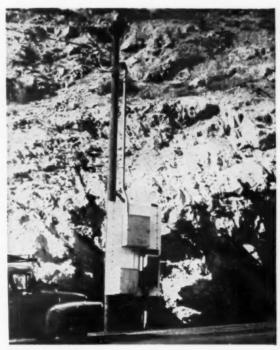
versely, they covered roadway surfaces within the tunnel with light-color concrete, then surfaced tunnel walls with two coats of white vinyl paint having an RF of 60%. This treatment has proved completely

satisfactory, economical and easy to maintain plus helping to reduce accidents.

This practical solution to a serious lighting problem was designed and installed under the supervision of H. Stead, traffic supervisor, Arizona Highway Department, while the entire electrical installation was handled by Newbery Electric Corporation through their branch office located in Tucson.



MULTIPLE MERCURY RELAYS are equipped with fuses on coil and load sides as well, while coils are additionally protected by lightning arresters. Switching of the 16 lighting circuits is regulated by astronomic clock with carryover characteristics synchronized to exact latitude of tunnel, while control is also instrumented through photocell unit.



SERVICE METER LOOP assembly, related to mercury-vapor approach lighting system, is mounted on creosoted poles anchored in concrete. Assembly includes transformer can, metering equipment, 400-amp 3-pole fused main switch and driven grounding rods. Black asphalt surface of approaches minimizes glare from sunlight.

# Magnetic Amplifiers Team Up With Amplidynes

. . . to control rolling-mill dc motor speeds. Completely automated, this new rolling mill employs closed-loop control to synchronize motor speeds rapidly and accurately.

NE of the latest advances in modern automation is a new copper rod mill at the Hatfield Wire & Cable Div. of Continental Copper & Steel Industries in Linden, N. J. Monitored by a lone operator, the mill automatically transforms copper bars—about the size of railroad ties—into coils of fe-in. diameter rod. This rod later becomes one of the various kinds of insulated electrical wire produced at Hatfield.

Fig. 1 shows the rolling-mill equipment layout and floor plan of the adjacent control room. To regulate speeds of the 100- to 200-hp dc motors, which power the mammoth rolls, engineers selected a magnetic amplifier-amplidyne system. This system has the fast speed of response and high accuracy required by rolling mills of this type. In addition, individual speed regulation for each roll-stand drive motor provides roll-speed synchronization. Roll-speed synchronization and accurate speed control are necessary for several reasons. As a bar is being reduced into a rod, it will be in nine roll-mill stands simultaneously. A change in roll speed may cause the rod to "loop," that is to leave the rod guides, or to cobble (pile up at the roll), delaying production.

Driven by a 4160-volt, 875-hp synchronous motor, a 600-kw generator supplies direct current to a common bus arrangement through steel-mill type line panels. From here, power extends in underground conduit to the 5 dc motors, which drive the rolls.

An underfloor forced-air cooling

system, ducted beneath the dc motors and the 550-hp roughing mill ac motor, directs a high-velocity air stream up and around the motors. Special enclosures around each motor create a positive pressure, which prevents copper dust and dirt from entering the enclosure, thus keeping the motor clean.

Auxiliary equipment includes motor-driven rheostats, a power distribution control center, a variety of controls and a magnetic amplifier-amplidyne control panel.

It is interesting to note that although this rolling mill is automated to a very high degree, practically all electrical equipment and controls are standard components, resulting in lower costs. And, because Hatfield engineers wanted the utmost in dependability, they specified only rugged, easy-to-maintain equipment.

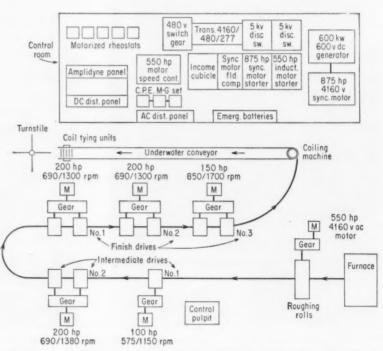


FIG. 1—Sketch shows rolling-mill equipment layout and floor plan of adjacent 2000-sq-ft control room. From the control pulpit, the lone operator can observe movement of the bar (bar travel indicated by arrows) as it is automatically being rolled into rod.

#### Rolling Process

A lone operator, in an elevated pulpit, controls the rolling process. Here, surrounded by a multitude of tachometers, voltmeters, ammeters, etc., he can observe the copper bars as they leave a 1600°F heating furnace on a powered conveyor. This conveyer brings the bars to the 3-roll-high roughing mill, which is powered by a 550-hp, 4160-volt ac motor. Here the bars automatically make five reversing passes through the rolls. After the fifth pass, the bar (now nearly 60ft long) continues on through the three intermediate and six finishing rolling mills. Thus the bar is gradually rolled into approximately 900ft of fe-in, diameter rod. After leaving the last rolling stand, the rod continues through guides to a coiling machine which, after coiling the rod, drops it onto an underwater conveyor. Traveling underwater, the coil of rod is quenched: emerges onto a machine which ties the coil and then loads it onto a turnstile ready to be taken to further processing.

#### **Power Distribution**

At Hatfield, this rolling mill is located in a separate building, which also contains other process and storage areas. Power enters the building underground at 4160 volts,

Located in a 2000-sq-ft control room adjacent to the roll-mill area, a 750-kva unit substation reduces the primary voltage to 480/277 volts, 3 phase.

In underfloor conduit, 480 volts feeds a distribution center. From here, utilization voltages fan out underfloor to serve distribution transformers, lighting and miscellaneous equipment.

Through a 2000-amp disconnect switch and a motor-starting cubicle, 4160 volts feeds the roughing-mill 550-hp ac induction motor. A 5-kv capacitor, installed across the motor terminals, helps to protect the motor from voltage surges. From an adjacent cubicle, 4160 volts also energizes an 875-hp synchronous motor. This motor is the drive for the dc power supply.

From the power supply generator, rated at 600 kw, 600 volts dc, four 250 MCM cables carry direct current through an underfloor plenum to the main dc distribution line panel. From here, 600 volts radiates in underfloor conduit to the dc motor armatures. Underfloor distribution was selected because of a 10-ton overhead bridge crane, which must reach all parts of the rolling mill.

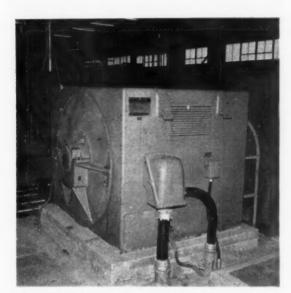
The dc distribution line panel is a ruggedly built traditional steelmill type. Protected by a 2000-amp air circuit breaker, ½ by 4 in. openmounted copper busbars connect 600 volts to dc motor contactors. Remotely operated from the control pulpit, these magnetic contactors have separately mounted overcurrent and overvoltage relays. And knife-blade disconnect switches provide manual disconnecting means for safety purposes.

Control wiring from the adjacent magnetic amplifier-amplidyne control panel extends to the dc distribution board overhead in parallel 4- by 4-in. screened ducts.

#### Closed-Loop Speed Control

The speed-regulating system provides "closed-loop" control. In a closed-loop speed-control system, an output signal, representing speed, is compared to a reference (in this case a voltage) representing desired speed. Any deviation of speed—and therefore the output signal—is fed back into the control system to make required corrections.

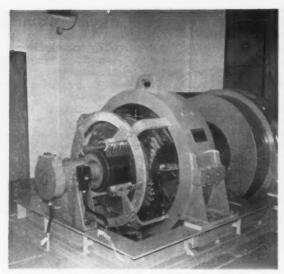
Major components in the speed-regulating system are: (1) dc supply 600-volt generator, which is magnetic amplifier-amplidyne regulated; (2) five roll-mill dc motors, each with individual magnetic amplifier-amplidyne control; (3) a constant potential generator, voltage regulated, which supplies 250-volt dc control power and the speed-regulating system reference voltage; (4) tachometer generators which provide the output (feed



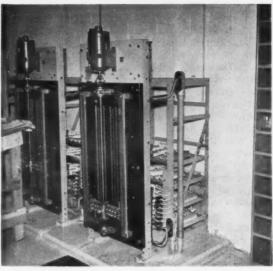
**SPECIAL ENCLOSURE** protects 550-hp 4160-volt ac rougher motor from copper dust and foreign particles. A high-velocity air stream, ducted beneath the motor, creates a positive pressure within the enclosure thereby keeping metallic dust and dirt out.



AC DISTRIBUTION CENTER supplies 480 volts to various motors and distribution transformers; 277 volts for fluorescent lighting; 120 volts to miscellaneous equipment. In the foreground, the constant potential exciter M-G set provides the 250-volt control power and reference voltages required.



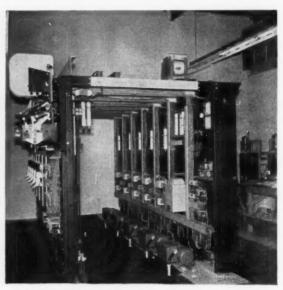
**DC GENERATOR**, rated at 600 kw 600 volts, supplies the armature voltage to the rolling-mill dc motors. Driven by an 875-hp synchronous motor, the generator is magnetic amplifier-amplidyne regulated. Three temperature-sensing elements trip an alarm if bearings overheat.



MOTORIZED RHEOSTATS, operated from the control pulpit, set voltage levels in the speed-control circuits. When the mill is on manual control, the operator can adjust the rheostats to make speed adjustments for any motor in accordance with tachometer readings.



MAGNETIC AMPLIFIER-AMPLIDYNE control panel has a separate speed-control section for each motor. On the front of the panel are tachometers, voltmeters and ammeters, which facilitate testing or troubleshooting. Magnetic amplifiers and amplidynes are mounted behind the panel.



**DC DISTRIBUTION LINE PANELS** (on left) feed 600 volts to the five roll-mill motors. The generator line is protected by an open-type 2000-amp circuit breaker. On the right is the magnetic amplifier-amplidyne control panel. Five amplidynes, one for each motor speed control, can be seen on the floor.

back) signal. These tachometers, coupled to rotors of each dc motor, generate a voltage that varies according to respective motor speeds.

Of course, there are varying degrees of accuracy in closed-loop control. And at Hatfield, the speedregulating system must start to correct any speed deviation, no matter how small, immediately. With the high-quality tachometer generators, extremely small speed variations generate voltages which are detected and amplified by the magnetic amplifiers. These magnetic amplifiers act as preamplifiers to increase the output signal to be applied to the control winding of the amplidyne. In this way, the moment a speed deviation starts to occur, it can be corrected before an extreme speed deviation can become established.

An electronic preamplifier could



**LONE OPERATOR** monitors rolling mill from an elevated control pulpit. By observing tachometers and ammeters, the operator checks motor speeds and motor current. Although the entire process is automated, he can stop the mill quickly in an emergency, or he may vary motor speeds if necessary.

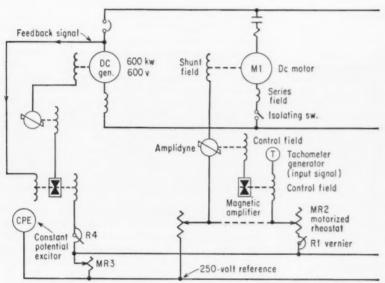


FIG. 2—Diagram shows basic speed-control system arrangement. The tachometer generator's output voltage, which varies according to motor speed, is applied to the magnetic amplifier control field. Preset by R1 and MR2, the reference voltage is also applied to the magnetic amplifier control field and, when the motor speed is correct, the two voltages balance. A minute variation in motor speed causes a voltage unbalance in the magnetic amplifier control field. Amplifying this unbalance voltage, the magnetic amplifier applies the signal to the amplidyne control field. This causes, in the amplidyne's high-power output circuit, either an increase or decrease of current to the shunt field of the motor, whichever is needed to make the proper speed correction.

have been selected in place of magnetic amplifiers. Electronic control would have resulted in more amplification and even higher accuracy. But Hatfield engineers desired the ease of maintenance offered by magnetic amplifiers and amplidynes. Moreover, the magnetic amplifiers-amplidyne combination resulted in speed control that is more than adequate for this kind of rolling mill.

The speed-controlled drive system consists of five dc motors on a common bus with the 600-volt generator. Years of experience plus

careful calculations have shown rolling-mill experts what the proper speed of each motor should be. Each motor, through adjustments of their individual speed-control systems, is set for a predetermined speed. And these speeds must be maintained accurately to avert the possibility of fouling a bar.

A minute speed change will cause the tachometer generator's output to change slightly. This small variation is preamplified by the magnetic amplifier. Greatly increased, the signal is fed to the amplidyne causing the amplidyne's output, which is connected in motor field circuit, to make speed corrections.

Because dc motor speeds are a function of armature voltage as well as field flux, the main dc generator is regulated, also by magnetic amplifier-amplidyne control. A motorized rheostat, connected in the generator's control circuit, can set over-all speed of the system. However, each motor has somewhat different characteristics. Because of this, their speeds do not change by the same ratio. To correct speed variations due to this armature voltage control, each motor has an individual speed-control system.

Referring to Fig. 2, an analysis of the speed-control system is as follows:

If the speed of motor M1 is correct, the output of the tachometer generator, which is applied to a control winding of the magnetic amplifier, will exactly balance the reference voltage which is also applied to a control winding. Under this condition, and with rheostats (R1 and MR2) previously set for correct voltage levels, the magnetic amplifier output allows the motor speed to remain unchanged.

If the speed of the motor drops, however, the output of the tachometer generator will drop. This unbalances the input signal voltage with the reference voltage causing current to flow in the output winding of the magnetic amplifier. This amplified output is applied to the control winding of the amplidyne. Direction of this control current flow is such that it causes the power current from the amplidyne to the motor shunt field to become smaller. Thus, the motor field is weakened resulting in an increase in motor speed.

The electrical installation was made by Molnar Electrical Contractors, Inc. of Woodbridge, N. J.

### Humidity and Condensation—V

Installation of vapor barriers in the electrically heated house.

By W. J. Novak

SELECTING and specifying an excellent vapor barrier to avoid future moisture damage is only a partial solution of the problem. To be completely effective, the barriers must be installed correctly and in the proper place. The heating installer should make certain that the principles discussed below are observed.

Where should the vapor barrier be installed? Actually, the criteria for vapor barrier location is that it be placed in such a position that its temperature will never be lower than the dew point of the ambient vapor. If it were, vapor would condense on its surface and defeat its purpose. For most construction, this means that the barrier is placed between the insulation and the interior wall, ceiling, or finished floor.

For most applications, it is generally recommended that the vapor barrier be placed as close as possible to the warm side of the wall, floor, or ceiling. This tends to raise the vapor resistance of the wall between the inside air and the sheathing; the resultant pressure tending to move moisture into the wall becomes less than the pressure tending to move moisture out of the wall to the outdoors. Also, through its high vapor resistance, the vapor barrier permits a much smaller amount of moisture to get into the wall in the first place.

The question arises as to its effectiveness in keeping moisture from condensing in the walls during the summer, when conditions are reversed and vapor pressure is greater outside the house. Because of the smaller indoor-to-outdoor temperature difference, temperatures within the wall are not likely to reach the dew point. However, there is a possibility, in areas having very warm summers, that condensation could occur within a fully insulated wall on the sunny side of a house (or in a ceiling) for one or two hours a day if inside temperatures are kept at 70F or lower by air conditioning. Such conditions are difficult to predict in advance; and if they do occur, their correction requires very specialized design involving strategic location of the vapor barrier or ventilation of the wall or ceiling cavity.

How are vapor barriers installed? As discussed previously, insulating batts and blankets may be obtained with a vapor-resistant material covering one face. These barriers are furnished with protruding flanges along each edge which may be stapled to the inside edges of the wall studs (or ceiling joists). By overlapping the flanges on successive studs, the result is a continuous vapor barrier over the entire wall surface. An alternate fastening method, used to some extent with 1- to 2-in. batts, has been to staple the barrier flanges to the faces of the two bordering studs, thus recessing the batt and forming an additional air space between the insulation and the plaster or gypsum board. However, this method leaves much to be desired from the standpoint of moisture control, since wood is relatively permeable to moisture; and the framing, comprising 10% or more of the wall surface, is thus unprotected by a barrier. Edge-stapling is more common in electrically heated houses, chiefly due to the extensive use of batts of full-stud thickness.

Where wall studs are on 16-in, centers and insulating batts at least 3-in, thick are used, considerable time can be saved by installing the batts between the studs without stapling. The usual 15-in, width

The series on humidity and condensation continues this month with a discussion of proper methods of installing vapor barriers. The final article will cover humidity control through ventilation:

Readers are invited to express opinions or submit their own experience data on any aspect of electric heating. Please address correspondence to:

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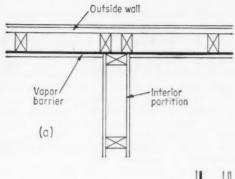
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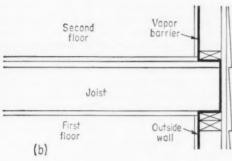
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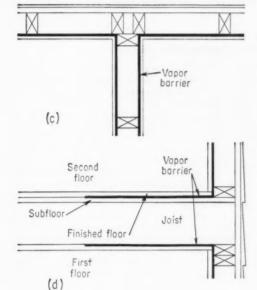
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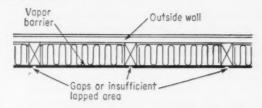
#### PLUGGING THE LEAKS



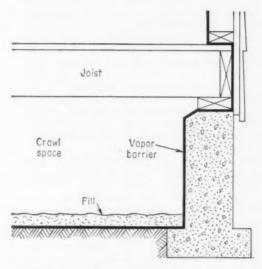




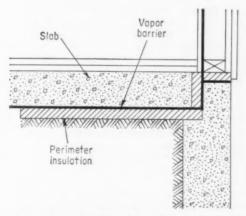
INTERSECTIONS of interior walls and multi-story ceilings with outside walls are often neglected in vapor-proofing and can be a source of moisture trouble. Sketches (a) and (b) show most effective way to protect these points but require that sections of vapor barrier be handled during early phases of construction. Sketches (c) and (d) show an alternative method. Barrier can be installed after framing members are in place but before finished walls, floors and ceilings are put in place. In (c), barrier should extend 1 or 2 stud spaces along partition; in (d), 2 or 3 ft under floor



**FLANGES** of vapor barrier furnished as part of insulating batts should substantially overlap edge of stud or joist at stapling point, since wood is very permeable to water vapor.



CRAWL-SPACE barrier protection should extend up sidewalls and around floor joists to protect against moisture from earth as well as living space.



SLAB-ON-GRADE construction should include vapor barrier over ground and over foundation to shield structure from capillary action of ground moisture.

and over ceiling. Lengths of any suitable vapor barrier can be cut for the purposes where barrier-faced insulating batts are used and can be left loose or tacked in place lightly until insulating job has been completed.

provides a snug fit, and the 3-in. thickness precludes settling or buckling. Vapor protection can then be provided by continuous polyethylene film across the entire inner wall surface. Stapling is required only at the extreme edges of the film and at windows or other openings, since the application of the finished wall will fasten it securely. For such an application, the batts need not have integral vapor barriers, nor even a paper enclosure; however, the enclosure will provide protection from physical damage during construction.

A ceiling vapor barrier is often omitted when blown insulation is used in the attic; however, this is poor practice. Full dependence is placed in such cases upon the effectiveness of the attic ventilating openings to dispel accumulated water vapor. While ventilation is important and necessary, it may be inadequate to properly vent excessive water vapor, particularly during periods of low average wind speeds. Omission of the ceiling vapor barrier is false economy, since any condensation anywhere in the attic space will drip down onto the insulation, impair its effectiveness, and increase heat loss—in addition to inevitable deterioration of the wooden framing or, in extreme cases, staining of ceiling plaster or gypsum board.

The most effective solution to this problem is to stretch a sheet of polyethelene film, 2 to 4 mils thick, across the entire ceiling, stapled to the underside of the ceiling joists, before the finished ceiling is applied. The insulation is poured or blown on top of the plastic between the joists after the ceiling is in place.

Floors above crawl spaces or unheated basements present another installation problem. Stapling the vapor barrier flanges of the batts to the tops of the floor joists before laying the subfloor is a difficult job, and the barrier as well as the insulation is likely to suffer considerable damage before construction is completed. On the other hand, if the flanges are stapled to the bottom edge of the joists from below, the vapor barrier will be facing the cold side rather than the warm side. Insulation manufacturers have simplified the problem recently by introducing batts with the flanges on the breather face of the insulation, so that they may be stapled from below and yet leave the vapor barrier on the face of the batt closest to the floor surface.

Where the conventional insulating batt is used, it is usually necessary to place the batt between the joists from below and then provide some means of support beneath the insulation (such as chicken wire, furring strips, or special supports manufactured specifically for the purpose) to hold it in place. This makes it possible to place the vapor barrier of the batt facing the floor. Again, large sheets of unbroken plastic film spread over the top of the subfloor provide a quick, simple and efficient means of vapor control, covering the joists as well as the insulation.

Considering the previous discussion on ground moisture, the question might arise as to whether it is more important in the case of a crawl space to protect the floor from moisture from below or moisture from the house interior. The answer is that both must be minimized—the interior moisture by one of the methods discussed above, and the ground moisture by a suitable barrier on the ground. If a concrete floor is provided in the crawl space, the

barrier should be laid before the concrete is poured to prevent moisture migration. If the floor is bare earth, the barrier should be spread to cover the earth. If rolled material is used, adjacent strips should overlap at least 4 in. If large plastic sheets are used, they should be overlapped where necessary.

We have here a situation where the structural members to be protected from moisture are bounded top and bottom by vapor barriers; therefore, some ventilation or dehumidification is necessary to dispel any vapor that does pass through the barriers into the crawl space. Minimum requirements for such ventilation will be discussed subsequently.

Throughout the installation of vapor barriers, particular care must be taken to seal any necessary openings in the barriers, such as at outlet boxes, ventilating fans, and around water pipes and electrical conduit. (Water pipes should preferably be between the vapor barrier and the insulation.) In addition to providing protection against moisture, the vapor barrier efficiently reduces infiltration of cold air into the structure. Careless tearing of the barrier and insulation around such wall and ceiling penetrations will not only permit water vapor to escape; it will aggravate heat loss. The accompanying sketches suggest additional considerations which deserve attention to provide a top-notch job.

#### New UL Standard for Electric Heating Equipment

An important new 81-page standard for heating equipment fabrication, Standards for Safety: Electric Space-Heating Equipment (UL 573, First Edition), has been prepared by Underwriters' Laboratories, Inc.

It includes detailed requirements which must be met by all equipment submitted for test to UL. Until April 1, 1962, UL will review all space heaters now listed to determine compliance with the new standard, notifying manufacturers of any change which must be effected to comply. During this time, manufacturers are also expected to review their own equipment and make necessary changes. After April 1, 1962, listing of equipment incorporating any features not in compliance with the standard will be discontinued.

Minimum standards are given for materials and components used in all commonly used wall, baseboard, and ceiling heaters, plus cord-connected units, duct heaters, and central furnaces.

This standard, adopted after long and careful study, discussion, and review by the Laboratories' staff, is a major step in the effort to insure that the outstanding performance and advantages possible with electric heat will be realized through the use of quality equipment.

#### Second NEMA Electric Heat Conference Scheduled

Final plans have been announced by the Electric Comfort Heating Equipment Section of the National Electrical Manufacturers Association for its second National Electric Comfort Heating Exposition and Symposium on March 19-21, 1962, at the Sherman Hotel in Chicago, III.

Theme of the exposition will be "Sell Electric Comfort Heating Cooperatively." Discussions at the planned seminars will feature calculations for various types of electric heat, methods and selection of equipment, new advances, and sales techniques. Chairman of the exposition will be Keith M. Spurrier, Central Area Sales Manager, Robbins & Myers, Inc. The morning of March 19 has been set aside for registration purposes.

### Heating Contractors, Plumbers, and Electric Heat

U. S. Dept. of Commerce survey shows installations made during 1959.

UESTIONNAIRES sent out by the Building Materials Div., Business and Defense Services Administration, U. S. Dept. of Commerce, to heating contractors, larger plumbing contractors, and fuel oil distributors in the United States provide what is perhaps the first available data on the extent of participation of these groups in the installation of electric heating equipment.

The survey covered only a selected portion of the 44,075 installers whose identities were available from government records, therefore extensions of the data to form conclusions of nationwide activity should not be made. Note that electrical contractors were not included; therefore the results are in no way an indication of total electric heat activity.

Of the 9,456 reports received, 6,805 reported installation of 392,680 heating units, including 3,003 (0.77%) electric heating systems.

The accompanying tables show a percentage breakdown of the electric heating systems reported, arranged according to geographical area, type of occupancy, and whether new or replacement, plus a summary of total units installed.

#### Installation of Electric Heating Equipment by Heating Contractors and Plumbers, 1959

District		New Cons	truction (%)		Replacement and/or Modernization (9				
District	Single Family	Multi- Family	Com'l. & Indust.	Sub- Total	Single Family	Multi- Family	Com'l. & Indust.	Sub-	
1	9	_	91	100	_	_		_	
2	32	_	8	40	29	24	7	60	
3	64	1	4	69	30		1	31	
4	49	-	2	51	48	_	1	49	
5	60	2	20	82	13	2	3	18	
.6	70	_	3	73	25	_	2	27	
7	59	_	33	92	5		3	8	
8	43		17	60	19	_	21	40	
9	12	9	15	36	61	*	3	64	
Entire U. S.	48	3	12	63	33	1	3	37	

District	Total Units Installed				
District	Number (Approx.)	%			
1	12	0.4			
2	72	2.4			
3	475	15.8			
4	285	9.5			
5	628	20.9			
6	544	18.1			
7	195	6.5			
8	72	2.4			
9	720	24.0			
Entire U. S.	3003	100.0			

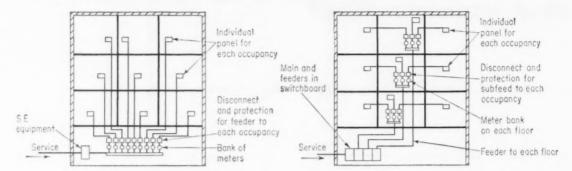
	Mass	NH	
	Conn	RI	
2.	Middle A	tlantic	5.
	NJ		٥.
	Pa		
3.	East Nort	h Central	
	Wis	111	
	Mich	Ind	6.
	Ohio		

1. New England Maine Vt

4. West h	lorth Central	7.	West Sout	h Central
lowe	ND		Okla	Tex
Kans	SD		Ark	La
Minr	Mo			
Neb	r	8.	Mountain	
			Mont	Wyo
5. South	Atlantic		Idaho	Nev
WV	a Md		Utah	Colo
Dela	SC		Ariz	NM
Fla	NC			
Va	Go	9.	Pacific	
			Wash	Hawaii
6. East Sc	outh Central		Calif	Ore
Tenn	Ala		Alaska	
Miss	Ky			

<sup>\*</sup> Less than 1%

#### FIG. 1—Basic Schemes for Individual Unit Metering in Multiple-Occupancy Buildings Are Limited by Requirements of Conventional Metering Techniques



Case I Individual feeder to each occupancy from basement meter bank. This system provides least diversity in distribution system, requiring relatively large amount of total conductor capacity. System demand is essentially the total of the individual demands of the feeders. Total rating of phase conductors is highest for any possible distribution system and full-size neutrals are generally required.

Case II
A common feeder to each floor affords use of lower demand factor in sizing conductors for total load of three unit occupancies. This layout and any variations on it, which permit use of a common feeder to a group of units, can effect substantial wiring economies in material and labor over the layout shown in Case I. However, the need for metering of the individual occupancies can appreciably curtail economies which could be made if conventional meter bank arrangements could be eliminated.

Substantial wiring economies with . . .

# Remote Metering System ... for individual unit meters

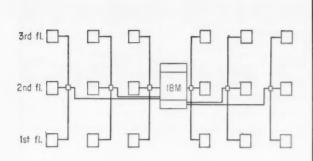
**System** ... for individual unit metering in multi-occupancy buildings.

For new construction and for modernization, this novel system provides for individual unit metering in multiple-occupancy buildings that have distribution systems designed for all of the diversity advantages of common feeders to groups of unit occupancies.

By J. F. McPartland

NEW system of remote energy metering can provide individual metering of each occupancy in a multi-occupancy building without the sacrifices in distribution economy normally required for unit metering, Fig. 1.

The key to this new remote metering method is a special type of current transformer applied at each point in the system where the energy is to be metered—such as at each subfeed to an individual occupancy. Fig. 2. This CT is designed to provide automatic ratio and phase-angle correction to compensate for the effect of inaccuracy



Case III
This is a common variation on Case II. One meter bank is used to supply three floors. The relatively long horizontal runs—commonly 3 No. 6 in 1-in, conduit—or 3 No. 4 in 1½-in, conduit—

may cause serious problems in buildings having steel construction

introduced by the highly increased

secondary burden of the unusually

extended secondary leads. This selfcompensation feature makes possible accurate measurements regardless of the varying lengths of

secondary leads from CTs to meters.

with only 4-in. slabs.

To effectively comply with the plan, the special CT is a relatively small device-approx. 4 in. by 6 in. by 2 in .- and is designed to be installed in the panelboard for each apartment or office tenancy. The low-voltage secondary wiring from the CT to its associated meter is approximately No. 20, since it carries a maximum of 1 amp when a CT with a ratio of 50:1 is applied to an apartment demand load of 50 amps per phase. All secondary wiring for all of the unit occupancies along a typical riser run up to 20 apartments of a 20-story building might be installed in, say, one 1-in. conduit. The meter to be used may. of course, be similarly selected for maximum of 1 amp or up to 21 amps.

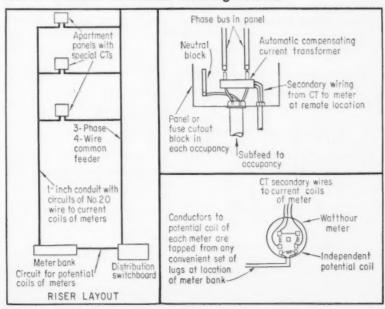
In operation, the losses through the long secondary leads are automatically compensated in the novel CT, which measures the load current with a predetermined constant ratio and without ratio or phase error. In order to simplify installation, the potential coils of all of the watt hour meters are directly conThis story discusses the many factors involved to metering of electrical energy utilization in multi-story, multiple-occupancy buildings. The method of remote individual unit metering with a self-compensating current transformer is the patented invention of Herman Wald, M. S., consulting electrical engineer, Astoria, N. Y. (He is chief electrical designer for Bardos & Ettinger, Consulting Engineers, N. Y. C.)

The over-all subject is vitally important in view of the accelerated building of apartment houses and office buildings with the widely varying attitudes of building managements on the subject of rent-included electric supply for tenants vs tenant purchase of energy. The method of metering selected for any such building may be a significant factor in cost of the building. The particular electrical load requirements of tenants may dictate either master metering or unit metering, or may indicate the desirability of master metering for some tenants with unit metering for other tenants. And local conditions as to availability of rental space and the competition among owners in renting out their space are often involved in the choice between master or unit metering. The remote metering system described here makes possible flexible and interchangeable use of both master and unit metering. We present this story to bring the problem into focus and to describe a solution which merits the attention of engineers, contractors and manufacturers.-Editor

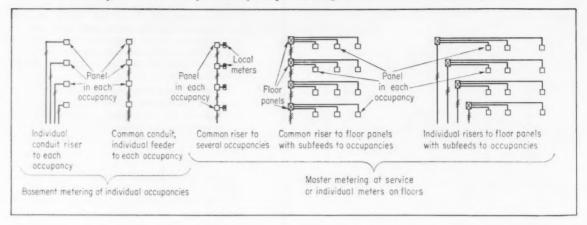
nected to the most convenient line terminals at the meter location. The remote metering system also incorporates protection which automatically interrupts the current supply through any CT in case of short circuit or an open in the secondary wiring to the meter. Thereby, use of energy is prevented when meter operation is interrupted.

Traditionally, individual metering in multiple-occupancy buildings—particularly high, multi-story buildings—has had one serious disadvantage. The distribution system, designed to accommodate all of the unit meters, was a more expensive and less efficient system than might be designed for the same load if unit metering were not required, that is, if master metering were

#### FIG. 2-Elements of Remote Metering Scheme



#### FIG. 3-Riser Layouts for Multiple-Occupancy Buildings with Conventional Metering



used at the service entrance for the entire building. Fig. 3. Where the meter bank or banks are located in the basement, a separate feeder must be used for each occupancy. run from the meter for the occupancy to the branch circuit panel in the occupancy. The system of many long feeder runs is costly in labor and materials compared with a common feeder system where diversity of utilization in a number of occupancies fed from one common feeder permits a lower demand capacity than the sum of the demand capacities of feeders where each occupancy has its own feeder. Fig. 4.

Another economic consideration in unit metering vs master metering is voltage drop. The problem of

voltage drop is greater when individual feeders are used instead of a common feeder. This arises from the relation between current ratings of conductors and the resistances of conductors. For instance, taking NE Code figures, a No. 1/0 RHW conductor, rated at 150 amps, has five times the carrying capacity of a No. 10 RHW, rated at 30 amps, based on allowable temperature rise in the insulation. But, as a result of rating conductors for current on their temperature rise, the circumference of the conductor material indicates the relative amount of heat-radiating surface for each size of conductor.

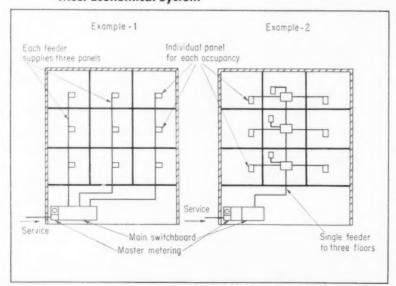
Current ratings increase in proportion to increase in circumference, but the ratio of circumference

to cross section area of conductors decreases with increase in con-Larger conductors ductor size. carry less amperes per unit of cross section. As a result, the larger conductors have lower resistance per ampere than smaller conductors, with consequent lower voltage drop for a given length of the larger conductor under full rated current than for the same length of a smaller conductor under its full load. Our No. 1/0 RHW conductor above has a resistance of 0.106 ohms per 1000 ft, whereas the resistance of the No. 10 RHW is 1.06 ohms per 1000 ft, or ten times that of the No. 1/0.

Considering the above characteristics, a 1000-ft run of No. 10 under full load will have a voltage drop of 30 amps X 1.06 or 31.8 volts. A 1000-ft run of No. 1/0 under full load will have a voltage drop of 150 amps X 0.106 or 15.9 volts. Any voltage drop disadvantage of a small conductor, here the No. 10, must be eliminated by increasing the size. Thus the common feeder distribution system has a big advantage from the standpoint of voltage drop.

Still another consideration is the requirement for neutral capacity in a common feeder compared with that in individual feeders. The need for full-capacity neutrals in the latter case may add substantially to the total amount of installed copper (or aluminum). In particular, where feeders or subfeeders to the individual occupancies consist of two phases and a neutral from a 3-phase, 4-wire wye system, the neutral must be fully-rated for the phase load even under balanced con(Continued on page 128)

FIG. 4—Master Metering Permits Any Layout of Distribution for Most Economical System



### Fixed-Price versus Cost-Plus Contracts

By Ray Ashley, Research and Consulting Engineer, Oak Park, Ill.

QUESTION: With similar costs and the same markups, which is the better
—a Fixed-Price or a Cost-Plus industrial contract?

ANSWER: The Fixed-Price contract.

#### DISCUSSION:

We are comparing the two types of contracts without considering the extra costs and difficulties often experienced in securing competitive work. To prove our point, let's study experiences common to most contractors: first with relation to Fixed-Price contracts; then those associated with Cost-Plus contracts.

#### **Fixed-Price Contracts**

In order to get fixed prices on a project, the owner must have complete plans and specifications. To figure the work, the electrical contractor must be thoroughly familiar with the job requirements and have a complete listing of materials and labor necessary.

When the contract is let, the stage is already set for the contractor to proceed in the most expeditious manner. He can formulate a definite program because he knows the approximate duration of the contract, the manpower requirements, the materials needed and how their delivery should be timed, and all other job requirements. Field engineering and construction drawings can proceed with dispatch. These and other fixed-price-contract advantages are familiar to most contractors.

Operating costs for Cost-Plus contracts usually run much higher than those for Fixed-Price contracts. Three principal reasons for this are:

- Greater cost of expediting.
   Extended duration (beyond normal).
  - 3. Extra cost of billing.

Cost of Expediting—Plans and specifications are often sketchy and far from being complete. The

contractor's engineer is obliged to make many trips to the owner's office to ferret or pump out details.

Because of lack of information and the uncertainty of the construction program, the contractor cannot use his mechanics to best advantage. Neither can he buy materials with the minimum amount of attention. Extra attention is required all through the

(Continued on page 220)

#### FIGURE 1—ITEMS OF EXTENDED DURATION COSTS FOR AN \$80,000 CONTRACT

BASE COSTS Material \$36,000 Labor \$24,000 NORMAL DURATION 5 MONTHS

	1	Normal C	Costs	Extended Duration Co			
ITEMS OF EXPENSE		The Jo	b	% of	Dollars		
	% of Dollars Labor Total Per Mo.		Normal	per Mo.			
Engineering & Plans (field engi- neering included) Field Office and Shop Expense	2.5	600.	120.	20	24.00		
(including Power and Light)	1.0	240.	48.	20	9.60		
Job Telephone	2.0	480.	96.	40	38.40		
Tools	3.0	720.	144.	20	28.80		
Ianeous Job Costs	3.0	720.	144.	20	28.80		
Travel Between Office and Job	0.1	24.	5.	60	3.00		
Overhead	20.0	4800.	960.	40	384.00		
TOTAL					516.60		

#### Relight School Stadium With Quartzline Lamps

Lighting an athletic field with Quartzline lamps provided an evenly distributed 20 footcandles.

N ENTIRELY new concept of outdoor sports area lighting was employed when the athletic field lighting at Brush High School, Cleveland, Ohio, was revamped to improve visibility for both players and spectators. Without increasing total system wattage, Quartzline lamps more than double the intensity of the original system.

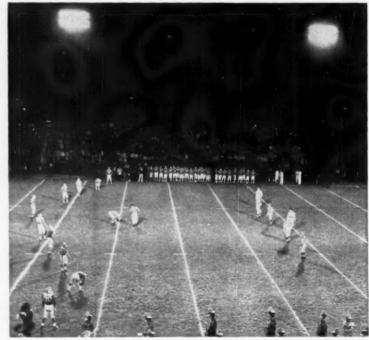
The first of its kind in the nation, the new system was designed and installed by lighting engineers from General Electric's Nela Park. It will be used as a model for the study of new quartz lamp application techniques for sports lighting. The old floodlighting system, installed in 1946, consisted of 64 1,500-watt incandescent lamps in reflectors grouped on eight poles, four on each side of the field. Illumination level at the field was eight footcandles.

The new system consists of 64 1,500-watt Quartzline lamps grouped on four poles, two on either side of the football field. Lighting intensity at the field is now an evenly distributed 20 footcandles, a level recommended by the Illuminating Engineering Society for Class IV stadia which seat 5,000 spectators.

In addition to securing double the footcandle intensity from the same wattage and number of lamps originally used, the school was able to eliminate four floodlight poles. This was accomplished by designing fixtures that project a light beam which has a narrow vertical and a wide horizontal pattern. By controlling light more accurately than equipment previously used, the new fixtures increase illumination by concentrating a higher percentage of light onto the playing field.

The new Quartzline lighting system offers the school added operating economy. The lamps come in weather-resistant quartz tubes, in in diameter and 10 in. long, rather than in glass bulbs. They last twice as long without sacrificing the amount of light produced, and they maintain their original light output and efficiency through-

out their lifetime. Constancy of light output is attributed to a revolutionary "iodine cycle" in which, as the tungsten filament evaporates, iodine vapor continuously carries back to the filament the tungsten particles which otherwise would blacken the wall of the tube.



**NEW LIGHTING** with Quartzline lamps doubles footcandle level on playing field without increasing total system wattage. New lamp fixtures are grouped on four poles instead of the eight needed for the original floodlighting system.



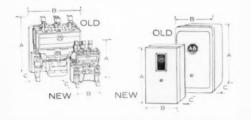
**OLD LIGHTING** at Brush High School stadium provided only eight footcandles of illumination on the field. The 64 1,500-watt floodlights were grouped on eight poles, four on each side of the field.



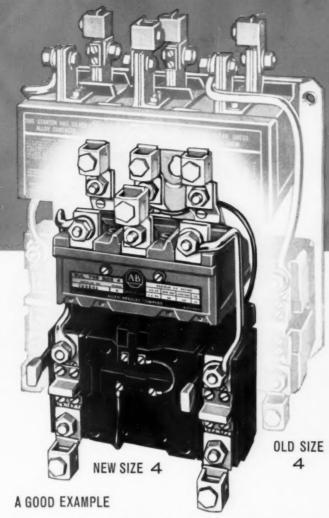
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		OPEN	TYPE	STAR	TERS		NEMA 1 ENCLOSURES					
Starter	Hei	Height A		ith B	Dept	th C	Heig	ht A	Widt	th B	Dep	th C
Size	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD	NEW	OLD
00	41/8	_	3%	_	311/16	-	711/16	-	47/8	-	41/2	-
0	57/8	55/8	41/8	43/4	311/16	31/4	93/16	71/8	6%6	55/8	4%	41/4
1	65/8	57/8	45/8	5	311/16	31/4	10	813/16	613/16	6%	45/8	41/4
2	75/8	101/16	45/8	53/4	311/16	47/32	12	141/2	75/8	9	45/8	57/16
3	101/4	12%	61/4	71/4	5 1/32	57/16	16%	191/2	10%	11%	71/4	611/16
4	11%	161/4	73/8	123/4	61/8	615/16	22	26%	11%	143/16	81/4	711/16
5	15%	20	91/2	161/8	85/8	83/4	321/8	411/2	173/16	19%	101/8	13%6

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# Your A-B Handy Catalog Lists These Control Devices Often Considered "Special" A-B



#### BULLETIN 840 Float Switches

These quality switches are available in a wide range of types for automatic control of motors operating tank or sump pumps. The snap-action switch mechanism assures positive operation, no matter how slowly the liquid level changes.



#### BULLETIN 1270 Automatic Transfer Switches

These switches are designed to transfer power-load to standby supply when normal power fails or drops too low. Automatically returns load to normal supply when power is resumed. Mechanically interlocked.



#### BULLETIN 812 Phase Failure—Phase Reversal Relays

Style F relay (above) protects against all open phase conditions on a branch motor circuit. Style R disconnects the motor upon a phase reversal. Style RF gives phase failure and phase reversal protection.



#### BULLETIN 555 Speed Regulators

Provide manual speed control of wound rotor motors for either fan or machine duty. When used with magnetic starter, the first step closes control circuit.



#### BULLETIN 1232 Pump Control Panels

Complete units for automatic operation of irrigation and oil well pumps. Employ standard A-B Bulletin 709 magnetic starter with manual disconnect switch or circuit breaker in weatherproof enclosure. Wide variety of optional features available.



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#### BULLETIN 803 Rotating Cam Limit Switches

Heavy-duty controls for use on automatic production machines. Made with up to 12 independent circuits which can be separately adjusted for operation at any point of rotation.



#### BULLETIN 365 Multi-Speed Drum Switches

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QUALITY MOTOR CONTROL

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#### Frequency Indicator

Line frequencies of 60 cycles and 400 cycles can be determined with two handy "homemade" indicators. One will indicate a frequency of 60 cycles or less, while the other will indicate a frequency of 400 cycles or higher.

These units are for use on 115-volt circuits. Fig. 1 shows the circuitry for the 60-cycle indicator. And Fig. 2 shows the circuitry for

the 400-cycle indicator.

Components are inexpensive and readily available. Parts required for each unit are: (1) a NE-51 neon lamp; (2) a ½-watt carbon resistor (68k or 100k); (3) a 200-volt 0.01 mfd ceramic capacitor; (4) a pair of test leads; (5) a long-handled rubber plug; (6) a pigtail receptacle.

To build your own indicator, follow the instructions below.

1. Remove a section from the side of the plug large enough to house the resistor and capacitor.

2. Insert the neon lamp into the

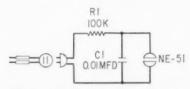
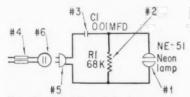
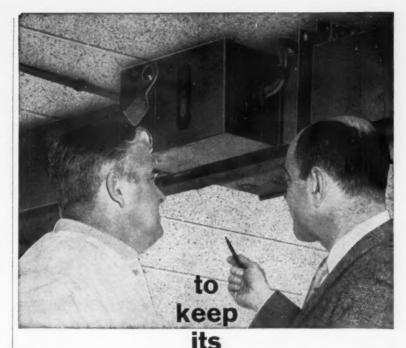


FIG. 1—60-Cycle Indicator. When the test leads are applied across 117-volt 60-cycle source C1 has a value of about 250k ohms. Because of the voltage divider (R1-C1), the voltage across the neon lamp will be about 80 volts. Since the lamp glows at approximately 50 volts rms, the presence of a 60-cycle voltage is indicated. If the test leads are applied across a 117-volt 400-cycle source, C1 would then have a value of 40k ohms. The voltage across the lamp will be about 33 volts. And this is not high enough to cause the lamp to glow, which indicates the absence of a 60-cycle source.



Note: Numbers 1 through 6 refer to parts list below.

FIG. 2—400-Cycle Indicator. When the test leads are applied across a 117-volt 400-cycle source, the voltage across the neon lamp will be about 74 volts. The lamp will glow indicating a 400-cycle source. On the other hand, if the test leads are applied across a 117-volt, 60-cycle source, only 25 volts will be across the lamp. As a result, it will not glow.



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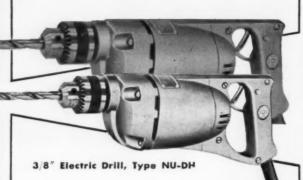
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handle with the tip just protruding from the end.

3. Insert the resistor and capacitor into the side of the plug.

4. Solder all leads after making connections according to the appropriate wiring diagram.

5. Solder the test leads to the pigtail of the receptacle.

6. Insert the plug into the receptacle and tape together with electrical tape.

7. Continue taping to cover the cut-out in the side of the plug.

8. Mark each unit with its correct operating frequency.

#### Switch from Gas to **Electric Operation** Saves 65%

Up until last year, Rosey Tire and Retreading Co. of Los Angeles did a modest business with two steam-heated vulcanizing models, but business came to a sudden halt when the gas-fired steam generator exploded.

To avoid the possibility of another similar incident, Maurice Rosenberg, the owner, decided to "go electric" and he now has a 5mold 18-amp 220-volt machine in his shop. This switch from gas to electric operation was dictated solely by safety considerations but. after five months, he is enthusiastic about resultant economies and a better product.

Prior to the fire, average monthly



**ELECTRIC RETREADING UNIT, consist**ing of five 220-volt temperature-controlled vulcanizing molds, replaced gasfired steam generating unit in Los Angeles tire shop. Owner Maurice Rosenberg claims that electric equipment is cheaper to operate, cleaner, occupies less space, produces a better product, is cooler, more flexible, has a longer life and requires less maintenance.

Electric Bench Polishers Electric Tappers

Electric Screw Drivers

Electric Hand Shears

Electric Circular Saws Portable Electric Planers

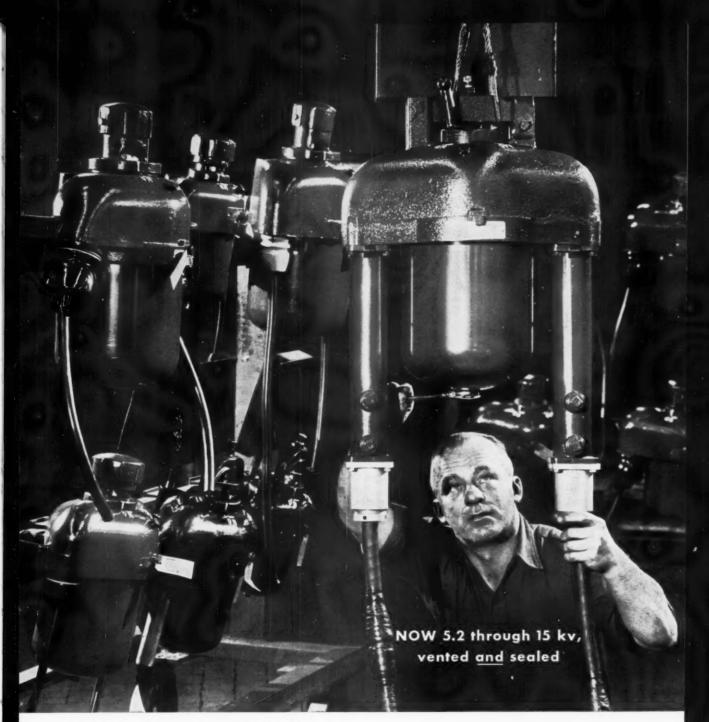
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gas bills amounted to \$27, while water for the steam generator added \$4 and "incidental" electricity amounted to \$8; indicating a utility charge of \$19.50 per month per mold.

Now, with electricity as the only utility involved, average monthly bills are \$27.50. And, with five molds in operation instead of two, the resultant per-mold charge has been reduced to \$5.50, a substantial saving over gas.

Reducing these charges further to a cost-per-tire basis, the gassteam cost was  $12\frac{1}{2}$  cents compared to the present cost of 3.6 cents, a 65% reduction.

In addition, the owner claims that:

- 1) Without the boiler, steam and condensation piping, electric equipment occupies considerably less space.
- 2) Constant mold temperatures were difficult with the former equipment, while uneven heating, caused by "blows," resulted in about 5% of the operations. Cold spots created by condensation of steam resulted in customer complaints and rejects, necessitating replacement of defective tires under a guarantee arrangement. With electric units, full temperature control is now available for each individual mold. These advantages, together with an improved mold contour, result in a better product.
- 3) Radiation from the steamheated unit was high. Now it is possible to rest your hand on the outside of the unit without discomfort, illustrating the factor of cooler operation made possible by electric units.
- 4) When a rush retreading job had to be performed over a weekend or holiday, it formerly was necessary to heat the entire steam system, requiring 1½ hours. Since electric molds are individually heated, they now come up to their operational temperature of 290 degrees in 20 minutes.

This indicates greater flexibility in operation.

5) Maintenance is reduced and guaranteed life is more readily attained

As summarized by Mr. Rosenberg, "Electric operation not only is cheaper and cleaner, but I now can turn out a superior tire at less cost, in less time, with better bonding."

Installation of wiring and controls for the new tire equipment was made by L&M Electric Co., Los Angeles.

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See your Skil distributor NOW for complete information. But hurry! This sensational trade-in offer is for a limited time only! Look under "Tools—Electric" in the Yellow Pages. Or write: Skil Corporation, Dept. 130I, 5033 Elston Avenue, Chicago 30, Illinois.



#### Only Skil Roto-Hammers have 3-way action



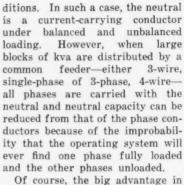




...and only Skil Roto-Hammers use 4 types of percussion-rotary bits...over 150 accessories in all for unequalled versatility!

#### REMOTE METERING SYSTEMS

[FROM PAGE 118]

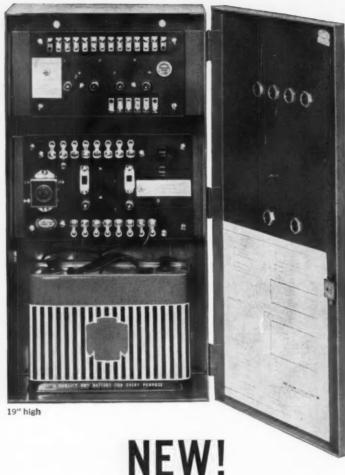


Of course, the big advantage in a common feeder over individual feeders—or the big advantage of master metering over unit metering—is in the reduced demand on a common feeder. If, for instance, such demand on a common feeder was 50% (or 35 or 25%, according to the NE Code) of the sum of the demands of subfeeders supplied by the feeder, the cost of distribution for an individual metering job over a master metering job might run up to a 100% increase.

In many systems where individual metering is required, design of the distribution layout does take limited advantage of common feeders. For instance, a common feeder for each floor may be run to a meter bank on each floor, or a common feeder for three floors may be run to every third floor starting with the second floor where the meter bank serves three floors of apartments. Then a separate subfeeder for each unit occupancy is derived through a meter. However, this system still falls short of ultimate economies available if conventional unit metering were dispensed with.

In view of all of the foregoing, the new system of remote metering has much to offer in the way of providing for individual metering while permitting a distribution system with no restrictions on its design. Remote metering provides individual-occupancy metering at the distribution cost of a master metering layout.

One of the most important applications for this new metering system, in addition to new construction, is in cases where an existing master-metering installation is to be converted to individual submetering. The new method permits such change without any alterations in existing distribution.



### Fire Alarm Control Cabinet

Kidde's new compact automatic fire alarm combination panel monitors four circuits with local alarm. A one-circuit cabinet is also available with or without the 4-zone annunciator. Any number of detectors and noncode breakglass stations can be used with the new cabinet, and a locking-type alarm relay permits the use of self-restoring detectors or sta-

tions. The unit provides for two vibrating bell circuit terminals.

U.L.-approved, the new Kidde unit draws power from any 120 volt AC source and converts it to 6 volts DC for operation. In case of power failure, a trouble alarm sounds, and the entire system automatically transfers to self-contained battery operation. For more information, write to Kidde.



Kidde Ultrasonic & Detection Alarms Division, 985 Brighton Road, Clifton, N. J.
Walter Kidde & Company, Inc.

# Why you should SPECIFY SEALTITE by ANACONDA

#### to protect electrical wiring

You know the trouble spots in plants where electrical wiring has to be protected against hazards. Perhaps you've spotted the problem as moisture . . . oil . . . vibration . . . chemical fumes . . . dust . . . corrosion. If you recommend that the wiring be enclosed in SEALTITE, then you know it's protected by the best flexible electrical wiring conduit available. Its strong galvanized steel core is protected by a tough polyvinyl chloride cover. Extreme flexibility permits installation in cramped quarters ... and in installations that must hug contours. Easy to work with, too. Specify the original, the best. It costs no more. Available from leading electrical wholesalers. For new SEALTITE bulletin S-544, write to Anaconda Metal Hose, P.O. Box 791, Waterbury 20, Conn.

61-942

#### SPECIFICATIONS

	Trade		ETER		SIDE	Approx. Inside	Feet	Approx. Shipping Wgt.	Feet Per	Approx. Shipping Wgt.
Size (In.)	Min.	Max.	Min.	Max.	Bend Diam. (Inches)	Std. Coil	(Lbs.) Per Std. Coll	Std. Reel	(Lbs.) Per Std. Ree	
A	3/8	.484	.504	.690	.710	6	200	60	1500	460
S	1/2	.622	.642	.820	.840	7	200	70	1000	365
PE	3/4	.820	.840	1.030	1.050	10	150	70	850	420
Y	1	1.041	1.066	1.290	1.315	13	100	90	600	525
-	11/4	1.380	1.410	1,630	1.660	16	50	70	375	430
_	3/8	.485	.505	.690	.710	4	250	60	1500	390
	1/2	.620	.640	.820	.840	5	200	60	1000	325
	3/4	.815	.835	1.030	1.050	6	175	70	850	375
EF	1	1.030	1.055	1.290	1.315	8	100	60	600	420
	11/4	1.370	1.395	1.635	1.660	9	100	80	375	360
TYPE	11/2	1.575	1.600	1.875	1.900	11	50	55		
F	2	2.020	2.045	2.350	2.375	14	50	75		
	21/2	2.480	2.505	2.850	2.875	19	50	105		
	3	3.070	3,100	3.470	3,500	23	25	80		
	4	4.000	4.040	4,460	4,500	28	25	105		



a product of

ANACONDA METAL HOSE DIVISION







### It moves

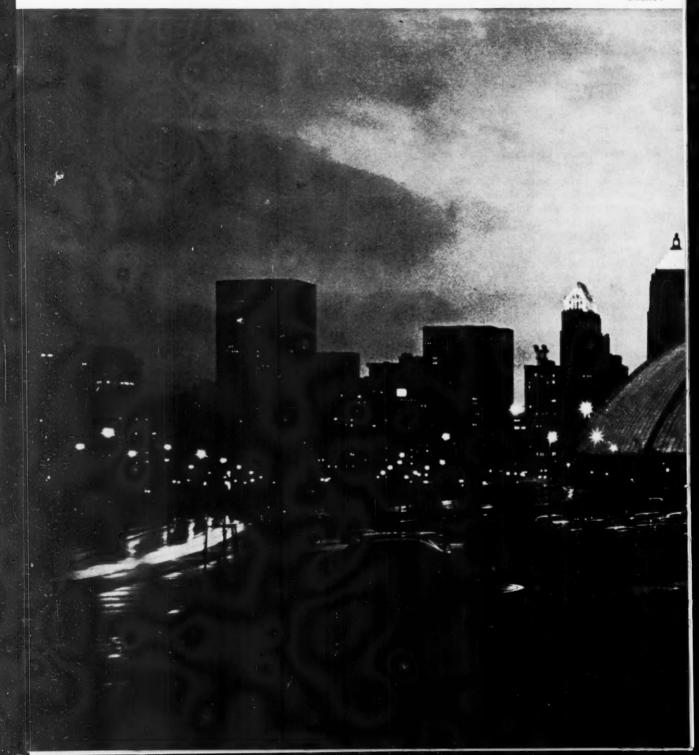
... powered and controlled by Westinghouse

Press a button—an indoor auditorium becomes an open air stadium in 2½ minutes—and behind that button is an unparalleled story of engineering and construction cooperation.

Architectural and engineering teamwork has given Pittsburgh the world's first movable roof auditorium. This versatile structure adds to the city's renaissance, in one building, a 14,000 seat sports arena, a convention hall, open air amphitheater, and an exhibit center. Westinghouse products bring the facilities to life, give precision control for the delicate manipulation of six 300-ton movable leaves.

Outwardly, the new auditorium is a 400' stainless steel

J-94176-1



#### ADVERTISEMENT

umbrella, suspended from a space frame cantilevered from the ground. That is one outstanding construction teamwork story.

work story.

Inside, coordination culminates in a control console located high above the seating area. From this station the

Construction Motivators: The Authority & Industry
1 to r seated: Judge A. L. Wolk, Vice Chmn.; N. Stabile, Sec'ry Treas.;
W. B. McFall, Chairman; H. R. Edelman, Jr., Pres. Heyl & Patterson;
and D. J. McDonald, Vice Chmn.
standing: C. B. Jansen, Member; J. E. Payne, V. P. Westinghouse; and
Edw. Fraher, Exec. Director



J-94176-2





The six movable roof leaves are driven by Westinghouse right angle gearmotors, five to each leaf. Photo shows base of one of the movable leaves with the acoustic ceiling panels removed.



O. M. Newman, Heyl & Patterson, and Edward Cohen, Ammann & Whitney, discuss roof electrical drive with C. G. Falkenstein, Westinghouse, kneeling in front of main roof reactor control cabinet.



unique movable roof drive system is activated. An AC reactor control scheme keeps all six movable leaves in step throughout open and close cycles. Each leaf is driven by Westinghouse Moduline® gearmotors, with opposite leaves being operated in pairs.

Close cooperation among architects, engineers, owner, contractors and Westinghouse helped to provide a system flexible enough to serve varying building demands, with the high degree of electrical reliability required.

For more complete information on the electrical aspects of construction, write to: Westinghouse, P. O. Box 868, Pittsburgh 30, Pennsylvania.



5KV metal-clad switchgear contains a tie-breaker to provide emergency switching between two incoming 4160-V lines. Seen here: N. J. Grady, V. P., Ernst, C. J. Long, and A. B. Janaszek.



Checking construction progress are C. J. Long and F. J. Sarknas, Westinghouse. In background, 1500 kva power center supplies power for building auxiliary and air conditioning compressor motors.



Westinghouse Motor Control Center located in the Mechanical Room centralizes auxiliary motor controls. Discussing installation advantages are H. R. Helvenston, C. J. Long and N. J. Grady.



Three 125 hp Lifeline A motors drive freon compressors to chill brine supply for ice rink piping. Seen here are P. F. Schad, Limbach, and C. G. Falkenstein, Westinghouse.



Operator's view from roof control console high above the spectator area. Visible through the glass front is the juncture of the first two movable leaves of the roof.



One of main power transformers rated 2500 kva at 11.6 kv to 4160 volts. Discussing the power supply are C. J. Long, Electrical Engineer, M. A. Geffel, Ernst, and A. B. Janaszek, Westinghouse.

Builder: Public Auditorium Authority of Pittsburgh & Allegheny County: Resident Engineer & Supt. of Construction: H. Rey Helvenston

Architects: Mitchell & Ritchey, Pittsburgh Roof Designers & Engineers: Ammann & Whitney, N.Y. Electrical Engineer: Carl J. Long & Associates, Pittsburgh

Electrical Engineer: Carl J. Long & Associates, Pittsburgh Mechanical Engineer: John Mullin & Associates, Pittsburgh General Contractor: Dick Corporation, Large, Pa.

Electrical Contractor: E. C. Ernst, Inc., Pittsburgh Mechanical Contractor: Limbach Company, Pittsburgh Drive System Contractor: Heyl & Patterson, Inc., Pittsburgh



Another Westinghouse power center, this 300 kva ASL dry type supplies lighting and auxiliary power. Discussing its component parts are C. J. Long, A. B. Janaszek, M. A. Geffel and Albert Simon, Ernst.



Type M Electric Stairway transports 8,000 persons /hr. Top to bottom: E. R. Gallagher, supervising architect; H. R. Helvenston, resident engineer; and A. Simmonds, Westinghouse Elevator.



Fan room equipped with series 8000 Air-Foil centrifugal fan and air conditioning coils. W. Y. Humphreys, Westinghouse, with John Mullin, Consulting Engineer, air conditioning and ventilation system designer.



Westinghouse mercury vapor parking area and floodlighting are operated from this remote control panel located in the mechanical room. M. A. Geffel, Ernst, tests lighting circuits.

#### WAGNER® DRY-TYPE GENERAL PURPOSE TRANSFORMERS

#### Compact **Epoxy-Filled** Units that

#### WHISPER WHILE THEY WORK

Unusually small in size (the 10 kva rating is less than a foot-and-a-half high), Wagner® totally-enclosed Type AE Single Phase Transformers can be used for general purpose applications. They have a low sound level, the result of encasing small Wagner Form W core and coils in a solid block of epoxy compound . . . to give you a whisper-quiet transformer that can be used anywhere noise would be a nuisance.

Available in ratings from 1 to 10 kva, Wagner Type AE Transformers have insulation protection suitable for continuous operation at 80°C in a 30°C average ambient. All parts are sealed from dust, moisture, and corrosion by the epoxy compound. Every unit is built to conform to all applicable standards of ASA and NEMA.

Wagner Type AE Transformers can be installed indoors or out in any location where they will not be submerged or exposed to injurious fumes in concentration. Compact and lightweight, they require no fireproof vaults and can be mounted indoors in any position, at any angle, on wall, floor, or ceiling. These transformers are carried in stock at Wagner branches and distributors. There's one near you, listed in your 'phone book. Call or write now.

#### Wagner Electric Corporation

6413 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U.S.A.

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Type AE-Single Phase-1 to 10 Kva 80° C Rise, 60 Cycles.

High Voltages: 120 x 240; 240 x 480; 600 volts, no taps; 480, 600 volts, 2-5% taps below normal.

Low Voltage: 120/240 volts.

	DIM	ENSIONS IN INC	CHES	NET WEIGHT AVERAGE SO			
KVA	Height	Height Width Depth		POUNDS	LEVEL DECIBELS		
1	1013/16	65/16	63/16	28	37		
1 1/2	1113/16	65/16	63/16	34	38		
2	131/8	613/16	73/16	46	38		
3	141/8	613/16	73/16	62	39		
5	15%	934	91/4	93	39		
71/2	161/16	911/16	10%	130	39		
10	171/8	111/4	101/4	167	39		

WT61-9



**FORK EXTENSION** brushes rings, that support power cable along adjacent messenger wire, thereby preventing looped cable from entanglement with hoist chain or wheels or rolling truck.

#### Simple Fork Protects Extension Cord for Hoist

Many motor shops have adopted the idea of installing a small I-beam above a work center, with a motorized chain hoist supported by a 4-wheeled truck rolling along the topsides of the beam's lower flanges. Many such installations also make use of adjacent messenger cables, with small rings spaced along the cable to support a hoist-powering extension cord at intermittent points.

This combination makes it possible for a shop employee to move the hoist along the beam to any desired position, although there is a tendency for the extension cord to festoon and lag behind the hoist's direction of travel. When the hoist is moving away from the remote source of power, which is usually located at one end of the beam, the trailing extension cord poses no particular problem. However, when the hoist is being moved along the beam in the opposite direction, that is, toward the connection point of the power cable, the extended festooning of cable along the length of messenger wire can often result in snarling or even entanglement with the hoist chain or truck wheels.

To eliminate this possibility, the operators of the San Jose Armature and Motor Works, San Jose, Calif., attached a small right-angle

bracket to the rolling truck, then welded to it a forked arm that extends slightly beyond, above and below the adjacent messenger wire. With this simple device, rings supporting the extension cable are brushed along the wire as the hoist is moved towards the source of power, and the looped power cord is thereby kept free from hoist and truck mechanisms.

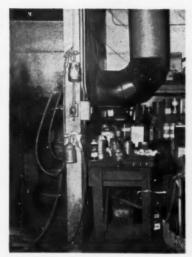
#### Combination Burn-Bake Electric-Gas Oven

For a small shop where space is at a premium and the volume of work is insufficient to justify an elaborate layout of specialized equipment, a combination burnand-bake oven such as one used by Conrad Electric of Oakland, Calif., is a practical space saver and multi- purpose facility. In this enclosure, insulation on coils to be stripped may be burned by means of a centrally placed gas cap, while freshly applied varnish may be subsequently baked in the same oven with regulated heat supplied by six 1000-watt electric strip units mounted along the sides of this practical assembly.

Electric heat is regulated by means of a thermostatic control secured to the rear panel, while baking cycles may be terminated by a clock-activated control switch. This combination rig has several advantages because, in addition to conserving floor space in the shop, the single enclosure requires only one exhaust system to serve these two operations.



RADIANT ELECTRIC strip heaters are mounted on walls of this combination oven to supply heat for baking, while a central gas nozzle serves as burning medium when coil insulation is to be charred and stripped prior to the rewinding of a motor.



AIR LINES and electrical conduit are contained within hollow fireproofed bulk-head located between paint booth and storage area, while spray guns and containers are supported by hooks on the bulkhead jamb.

#### Spray Booth and Locker Have Mutual Bulkhead

A metal-sheathed hollow bulkhead between a paint spray booth and an adjacent paint storage locker serves as a protected enclosure for the containment of air lines and distribution conduit related to spraying, lighting and exhaust equipment in the shop of the Kuchel & Sievers Electric Works, San Francisco. The booth (left) is also equipped with varnish-dipping and grease-solvent tanks, so that dripping is confined within a single fireproofed area, while vaporproof lighting and a large-capacity vented exhaust fan insures a bright, fumeand odor-free environment in which to work. Containers and spray guns related to several colors of enamel and paint are conveniently supported by hooks located on the front jamb of the common bulkhead, while switches for lighting and exhaust installations are placed on the locker (right) side, thereby minimizing the possibility of contamination by fumes or spray.

#### Infrared Rigs Deliver Concentrated Heat

Lindstrom, Inc., of San Francisco, utilizes a wide assortment of infrared baking rigs, the majority



#### Why Not KRALOY CONDUIT?

Corrosive gases, liquids, vapors or electrolytic action will not corrode a Kraloy Rigid PVC raceway. Kraloy is from 18% to 30% faster to install than any metallic conduit, and conductor pulling requires far less time and energy. Conductors are more than amply protected from crushing and impact. Conduit is U/L listed for underground burial or encasement in concrete, will not support combustion, and will not spark.

Your Kraloy electrical distributor will elaborate on the above features . . . or write

Kraloy/Chemtrol Co., Electrical Conduit Division, 402 W. Central Ave., Santa Ana, Calif.









ACCESSORIES



SLOTTED ARMS placed in desired positions by easily secured wing nuts, hold infrared lamps close to work being subjected to concentrated heat treatment. Entire assembly may be covered with asbestos blanket to minimize heat dissipation to shop area generally.

being portable so that heat may be positioned and concentrated upon specific work areas without having to move heavy or awkward assemblies into location-fixed and confined baking ovens.

Some indication of these flexible baking rigs is given in the above photo, which shows banks of heat lamps supported by horizontal channel members that may be rotated, raised or lowered, or moved inward or outward by means of related slotted arms. Wing nuts lock arms in desired configuration to vertical standards, while standards may be positioned-at-will due to castered pedestal construction.

In this case, sections of steel angles are placed atop wooden horses to support a unit to be baked, then lamp-supporting arms are positioned to form a cylindrical grouping around this intended baking center. Since connecting cords are long, flexible and durably insulated, and since switching permits flexible control of desired number of lamps, this rig and many others of similar design are useful tools in this busy shop.



SAN JOSE Armature and Motor Works, Calif., owned and operated by Al Nelson and Walter Thomas Jr., is an active sales-service organization handling power tools and welding equipment in addition to all types of motors and controllers.



STANDARD ELECTRIC & Engineering Co., San Francisco, is owned and operated by the father-and-son combination of Pompey (right) and Bob Scribante, who have built and maintained a reputation for quality motor service through a policy of consistent attention to details.

#### Air Cutter Nips Coils

Prior to stripping damaged coils from stator slots, shop employees of the California Electric Co., Oakland, first cut through coil loops around one end of the frame. Then, after charring coil insulation in a burning oven, unsevered loops are grasped and pulled free with tong clamps. Cutters and tongs alike are given power by plunger cylinders activated by foot-pedal pressure. And, when operated by an experienced worker, these useful devices are high-calibre time savers. Since the cutter shown is mounted atop a knee-high concrete pedestal, and since cutting action is controlled by foot pressure, the operator can keep both hands free, at a convenient level, to manipulate the stator being reconditioned.



**FAST ACTION** by foot-controlled plungerpowered cutting blades speeds severing of coil loops prior to insulation-charring and coil-stripping operations.

# NOW...GLOBE OFFERS... two new INTERCHANGEABLE trays for support of cables, wiring and tubing



cation wire, instrument tubing and control cables in automation applications. These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

Distributors are to be found in all principal cities—consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.



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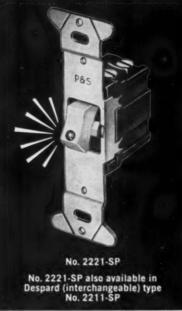
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# 3 NEW P&S ROCKER-GLO SWITCHES!







1

#### LIGHTED HANDLE ROCKER-GLO

Pinpoints switch location in darkened rooms or hallways. Tiny, longlife neon lamp softly glows in OFF position only. Single pole or three-way. Rating: 15 Amperes, 120 Volts, A.C.



### Pilot Light HANDLE ROCKER-GLO

Instantly shows when appliances or lights are on. Tiny red plastic jewel in rocker button lights in ON position only. Single pole only. Rating: 15 Amperes, 120 Volts, A.C.

#### 99

#### REMOTE CONTROL ROCKER-GLO

Momentary contact, center "off" switch. Designed especially for low voltage remote control applications—controlling large banks of lighting, operating stage curtains, etc. Single pole, double throw. Rating: 10 Amperes, 48 Volts, A.C.

For more information write Dept. ECM961



### PASS & SEYMOUR, INC. SYRACUSE 9, NEW YORK

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### **Product News**



#### Lighting Fixture

A new "Trim/Line" outdoor lighting fixture features six ultra high output type, 1500 ma lamps. Fixture housing is all-aluminum and measures 33 in. high. The flat silhouette lends itself to both new construction and modernization. Furnished in 4-, 6- and 8-ft lengths, unit is also available in 4-lamp models. Fixture features a hinged door assembly constructed of anodized aluminum extrusions and clear acrylic plastic. Ballasts are 1500 ma outdoor, non-weatherproof type, high power factor, suitable for starting and operating at low temperatures. They are mounted in overhead channel. Adjustable pole adapter allows vertical adjustment of fixture from horizontal to 45° above horizontal, and sideways adjustment from a horizontal plane to 30°

Guardian Light Company, 500 North Blvd., Oak Park, Ill.



#### Electric Furnace

A thermostat-controlled, forcedair electric furnace maintains even temperatures without recycling through the use of a "sequencer" control unit. Furnace is available in two cabinet sizes and six heat ratings from 34,000 to 119,000 Btu's. The 34,000-Btu model uses two elements and the highest rated 119,000-Btu model requires seven

elements. The "sequencer" control unit, which may control up to seven heating elements depending upon furnace rating, energizes only enough elements to supply the heat needed to satisfy the thermostat setting. Completely enclosed and insulated with 1-in, thick vinyl-coated glass wool, furnace can be operated vertically, horizontally, or upside down with only a minor change in the placement of controls.

Westinghouse Air Conditioning Div., P. O. Box 510, Staunton, Va.



#### Clamp (3)

An all-aluminum wedge clamp for aluminum neutral messengers at service dead-ends. Construction heavy-gauge, high-strength aluminum alloy, with flexible nylonjacketed bail or rigid stainless steel bail. Design of clamp eliminates need to thread cable through clamp. Because slider is removable, clamp can be installed anywhere on a continuous run of conductor. Wedging action grips tightly along entire length of contact. Only four sizes of new clamp are needed to deadend a range of cables from No. 6 solid through No. 4/0 ACSR.

Jasper Blackburn Corp., 1525 Woodson Rd., St. Louis 14, Mo.

#### Lamps (4)

A new series of 3-way and "Hi-Lo" 2-way incandescent lamps has been announced. Principal features of the new multi-level types are vertical filament construction and a new tapered base construction. The axial, or vertical, construction includes a "coiled coil" filament. The "Kon-Tact" base has a tapered contact ring. The 3-way lamps are available in the 50/100/150-watt range, inside frosted, and in the 30/70/100, 50/100/150, 100/200/300-watt ranges in soft white finish.

Lighting Products Div., Sylvania Electric Products Inc., Salem, Mass.



Tester

(5)

A new Mark III Megger insulation tester has been announced. Three ranges of instruments are available: 100 volts dc, 0.02-20 megohms; 250 volts dc, 0.05-50 megohms; 500 volts dc, 0.1-100 megohms. Each of these models is also available with the added feature of a double scale and selector switch for 0-10,000 ohms. The single scale, 500-volt model is for testing house wiring, domestic appliances, portable tools, etc., operating on 115 and 230 volts. The 250- and 100-volt instruments are for lower voltage circuits. Bulletin 21-85-6 is available.

James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.



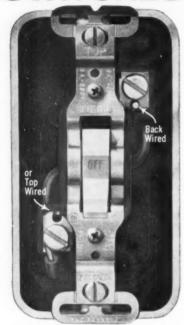
**Switches** 

(6)

Announcement has been made of the addition of new operators and optional features to this line of Type L precision oil-tight limit switches which provide flexibility of application. Nine new Type L limit-switch operators and switches consist of: roller lever with metal roller; roller lever with 1-in, wide roller; adjustable roller lever with 1½-in. diameter roller; adjustable spring rod actuator; adjustable nylon rod actuator; duplex limit switch; wobble stick with 12-in. wire extension; cat whisker operator; and precision adjusted roller lever available with either a metal or a nylon roller.

Cutler-Hammer Inc., 315 North 12th St., Milwaukee 1, Wis.

### SIERRA MERCURY SWITCHES



#### **TESTED** AT OUR FACTORY-NOT IN YOUR BOX

Some year's ago Sierra began the unprecedented procedure of testing each and every Mercury Switch under load conditions. Sierra has always contended that the place to verify a product's performance is at the factory-not after you get it in the box.

Sierra Mercury Switches are available in 1- & 2-pole, 3- & 4way; and Sierra-lite with neonlighted toggle handle.

#### ELECTRI CORPORATION 15100 SOUTH FIGUEROA STREET BOX 85, GARDENA, CALIFORNIA

Write for more information and catalog









#### Magnetic Starters

Flush-mounted magnetic starters for the machine tool industry and contractor installations have been added to the G-E 100 line of motor Available for cavity controls mounting in machinery or for mounting in plaster walls, the new forms are rated up to 600 volts, 60 to 25 cycles in NEMA Sizes 0, 1 and 2. For machine tool applications, starter can be furnished with a mounting bracket and front cover. When rigid conduit or BX cable is used, bracket is eliminated and starter is furnished mounted in an enclosure. Starters for mounting in plaster walls include a bracket, box and front cover. Box is mounted in wall prior to plastering like any wall conduit box. All forms are supplied with combination knockouts -two each at top, bottom and sides, and four in back.

General Electric Co., Schenectady 5, N. Y.



#### **Transistor Timer**

5, N. Y.

(10)

A new Atcotrol series 308 miniature transistorized timer for time control for laboratory and industrial process has been developed. Extended life is assured through the use of a simple timing network which has no moving parts or tubes. A filtered power supply working through a transistor operates a 2-pole double-throw mercury wetted relay. Through use of a transistor, immediate operation is possible. Load contact rating is 5 amps at 115 volts ac, non-inductive. Power requirements are 115 volts, 50/60 cycles; or 230 volts, 50/60 cycles. Timer may be flush panel mounted or surface mounted with available brackets.

and industrial plant distribution

systems. Sealed units should be used only in hazardous atmospheres or where there is a possibility of

submersion. Vented units are recommended for all other installations

such as substations, commercial and industrial buildings, shopping centers and schools. They can be used for load-switching on transformers, in metal-enclosed assemblies or in rack-mounted installa-

General Electric Co., Schenectady

Automatic Timing Controls, Inc., King of Prussia, Pa.

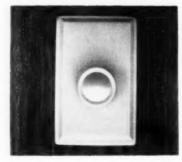
#### M-V Lighting Equipment

(8) A new line of mercury-vapor explosion-proof lighting equipment for hazardous locations. Available in two basic sizes to accommodate 250- and 400-watt mercury-vapor lamps, fixtures can be obtained in pendant, ceiling, bracket or flush concrete mounting type arrangements. Construction is copper-free aluminum castings with steel porcelain enamel reflectors of various types. Clear globes are available in either smooth or fluted or prismatic

Killark Electric Manufacturing Co., 3940 Easton Ave., St. Louis 13,

#### Oil Cutouts

A 15-ky sealed oil cutout, coupled with present 5.2- to 15-kv vented and sealed units, form a complete line of oil cutouts. Both sealed and vented cutouts in 5.2 to 15 kv are now offered to provide positive load-break operation and overcurrent protection on electric utility



#### Dimmer

The "Dimitron" provides fourstage lighting in standard wall box. Full lighting range may be dialed within a convenient one-quarter turn; off, 20% (Soft-glo), 50% (Glamor-glo) and 100% illumination (High-glo). The exterior is designed in gold and cream-beige. The electronic Dimitron controls up to 400 watts, incandescent only, with no interference to radio or television reception.

Lutron Electronics Company, 230 Fifth Ave., New York 10, N. Y.

### How You Can Eliminate Fluorescent Ballast Noise Problems in Your Buildings

Today's trend toward higher levels of illumination—increasing the number of fixtures, lamps, and ballasts, or increasing the wattage of the lamp/ballast systems—makes fluorescent ballast sound a more and more important building consideration.

General Electric wants you to take full advantage of modern lighting levels. At the same time, you should assure yourself that you can solve any audible ballast "hum" problems in your lighting installation with minimum attention and effort.

#### ALL YOU HAVE TO DO IS . . .

1. Check each lighting installation while it is still on the drawing board with the General Electric Sound Rating Calculator\* (see below) to predetermine whether ballast noise will be a problem, and . . .

2. Specify the appropriate General Electric sound-rated ballasts for the installation.

That's it. By properly following this two-step procedure, you can predict and overcome potential ballast noise problems before they exist.

General Electric, with five years of highly successful experience in the G-E Ballast Sound-control Program, is confident that this procedure will solve your ballast noise problems. Here's how the program works . . .

THE GENERAL ELECTRIC BALLAST SOUND RATING CALCULATOR is based on data gathered from hundreds of lighting installations over a period of many years. It provides a reliable index of the magnitude of audible ballast sound when room variables such as size, ceiling materials, and number of fixtures and ballasts are known. These calculations are keyed

GENERAL ELECTRIC'S BALLAST SOUND RATING SYSTEM. This system, initiated by General Electric in 1951, establishes a rigid scale of sound magnitude. Most General Electric ballast designs are carefully compared with this scale in actual fixture tests conducted in the only known anechoic sound chamber in the ballast industry. Each ballast design is thus "Sound-rated" "A" through "F," . . . "A" being quietest, and "F" being least quiet.

The sound-rating scale—and for that matter, the whole sound-control program—is not an industry standard. General Electric has established its own sound standards, and compares the performance of General Electric ballasts with these standards.

But the Sound-control Program doesn't end here. In order to give you further assurance that you get the "quiet" you specified, General Electric has established an elabo-

DAILY PRODUCTION SOUND AUDIT. A daily sample of production units is carefully compared in sound performance with the G-E sound-rating standard—under controlled conditions in the anechoic sound chamber. This close check on possible manufacturing variations means you get the kind of sound performance that your Sound Rating Calculator promised. The final element in G.E.'s Sound-control Program is ...

BASIC ENGINEERING DESIGN. General Electric ballast design engineers are constantly examining today's ballast circuitry, trying to further minimize the inherent magnetic "hum" of core and coil assemblies. An example of the re-

\* Copyright 1956, General Electric Co.

Progress Is Our Most Important Product



sults of this engineering effort is the recently announced "A" sound-rated 40-watt, rapid-start line. This popular family of General Electric ballasts was granted a G-E "A" sound rating as a result of basic circuit design that produced a smaller and quieter core and coil.

Materials are also an important sound-control factor. For example, the resilient asphaltic filling compound used in General Electric ballasts maintains excellent sound-absorbing characteristics over the entire life of the product. The new General Electric Bonus Line† ballasts, using this proved asphaltic filling compound, are designed to provide protection against objectionable ballast end-of-life leaking and smoking, without sacrificing any sound performance.

All this means that General Electric is truly concerned about ballast sound—and is investing heavily so you can stop being concerned with it yourself. Mail the coupon today for your General Electric Sound Rating Calculator, and start using it immediately. For more details, ask your local General Electric Ballast Sales Engineer, or write Section 403-02, General Electric Company, Schenectady 5, New York.

† Trade-mark of General Electric Company



### GENERAL ELECTRIC SOUND RATING CALCULATOR

This ingenious device was designed so you can always predict with 100% accuracy whether a lighting installation will present noise problems. You can use it for any indoor lighting application from extra-quiet broadcast studios to noisy offices. On the easy-to-use circular slide rule you simply (1) dial in room "constant," (ability of room to absorb noise); (2) number of ballasts and their sound rating and (3) given ambient noise level for your application. Steps 1 and 3 are immediately determined from tables which are part of calculator.

#### PLEASE SEND ME THE FREE BALLAST SOUND RATING CALCULATOR

Mail coupon to: General Electric Co., Section D403-02, Schenectady 5, N. Y.

NAME...

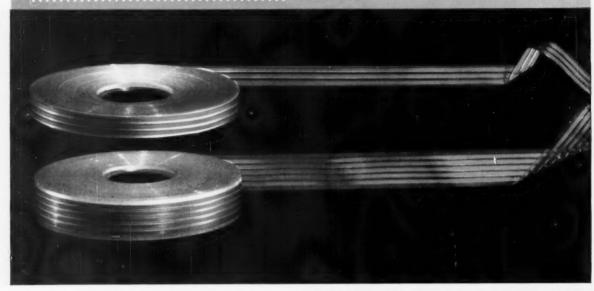
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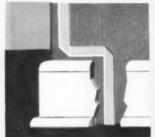
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STATE\_

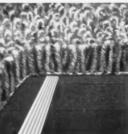
#### In ELECTRONIC COMPONENTS

if it's news, expect it first from IRC

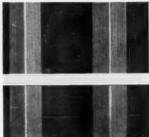




Installs behind surbases







Conceals easily behind wallpaper Saves drilling in walls and wood

### Use POLYSTRIP®... the new, easier way to make low-voltage interconnections

Users find POLYSTRIP a time, money, and headache-saver. The speed of installing this flat cable results in substantial savings. POLYSTRIP lies under floor coverings without causing bulges; slips between wallboard seams, behind moldings, through openings, thus eliminating drilling or cutting walls and woodwork. It fastens to finished walls, ceilings and baseboards with double-backed tape, doing away with conduit and plaster-cracking hardware. The many features of this new concept in cabling make POLYSTRIP equally valuable for new construction or renovation.

POLYSTRIP consists of uniformly spaced flat copper conductors laminated

\*POS-E-FLEX Connectors by The Thomas & Betts Co., Inc., Elizabeth 1, N.J.

with transparent plastics into a very thin, flexible, flat cable. Already proved in industrial electronics, it is now applicable for hi-fi, paging, signalling and alarm systems, programming, wired remote TV control.

#### INSTALLER'S KIT SAVES 47%

Assortment #205 saves 47% over the separate prices of items it includes. Contains 75-foot rolls of both 3- and 5-conductor cable; 6 splicing and 2 wire lead type connectors\* for both 3and 5-conductor cable; 50-foot roll of double-backed adhesive tape and 1 Stripping Tool.

International Resistance Company, 414 North 13th Street, Philadelphia 8, Pa.





Leading supplier to manufacturers of electronic equipment



#### **Timing Relay**

(12)

Class 9050 Type B and C timing relays are now available with a new 2-pole snap switch which doubles the number of contacts and mounts in the same space as a single-pole timer. Device is designed for applications where normally it would be necessary to install an extra timer or relay for control of additional circuits. Timing relay can also be furnished with one or two single-pole doublethrow instantaneous snap switch interlocks, and is easily converted from on-delay to off-delay and vice versa. Timing is adjustable from 0.2 seconds to 3 minutes, and contacts are totally enclosed to avoid dust and dirt problems. Timers are available for both ac and dc operation and in a wide variety of enclosures for any application. Bulletin 9050 is available.

Square D Company, 4041 N. Richards St., Milwaukee 12, Wis.



Ballasts

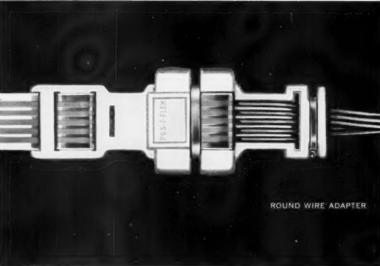
(13)

Fluorescent lamp ballasts for use in signs have been announced. They are available in a wide choice of rapid-start and slimline ballasts for use with a full range of lamp lengths in one to 4-lamp combinations. They are UL listed for non-weatherproof outdoor Type 1 and Type 2 use in signs. Each ballast is equipped with No. 14 gauge lead wires and enclosed in a white bonderized case.

Universal Manufacturing Corp., 29-51 East Sixth St., Paterson 4, N. J.

#### POS-E-FLEX™.....

another new connector system from T&B



PAT PENDING



CHASSIS SOCKET



WRISTLOCK CONNECTOR

### POS-E-FLEX<sup>™</sup>......gives you lowest installed cost for these wiring jobs

low-voltage house wiring • communications systems • automotive equipment • appliances • high fidelity equipment • public address systems • low-voltage controls • instrumentation

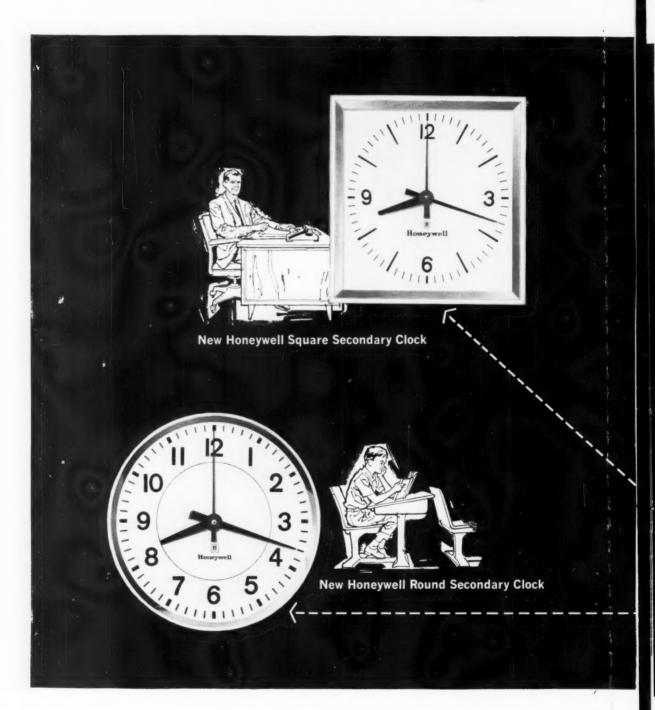
Flat conductor cable joined by POS-E-FLEX solderless connectors can increase your dollar return . . . add new prestige values to every job.

Three basic connector types handle any flat cable connection, adapt to round wire—provide quick "snap-on" convenience.

See your T&B Distributor or write The Thomas & Betts Co., Inc., Elizabeth 1, N. J. In Canada: Thomas & Betts Ltd., Montreal



# New Honeywell



# ClockMaster System!

New styling! New works! New reliability!
... Same simplified installation
and famous Honeywell follow-through

Henry Dreyfuss, noted designer, styled the appearance. Honeywell designed and manufactured the clocks. Result: a new standard of clock styling, accuracy and dependability—ready and waiting for your next job.

#### Now two standard secondary clocks

To complement modern styling, Honeywell has introduced a square, ultra-modern secondary clock. You can combine it with the new Honeywell round secondary clock in systems to better match decorating requirements. Both clocks have bold, clear numerals that are easy to read at a glance.

#### Life tests show no failures in over six years

Both the new square and round secondary clocks have new rocker arm assemblies plus vital parts made of teflon. This cuts friction and wear. Increases accuracy, reliability and life. So much so, in fact, that accelerated life tests have shown no failures in over six years—and the tests are still running!

#### Foolproof system operation-even during power failures!

Programming of this newly styled master clock is so easy to change, one of your customer's employees can do it. Master time and programming units are positively linked so they can't get out of step. If power fails, the master clock switches automatically to a spring operation that runs it for 12 hours. Because each clock in the system is independently and automatically corrected hourly, all clocks are kept on time.

#### No installation headaches

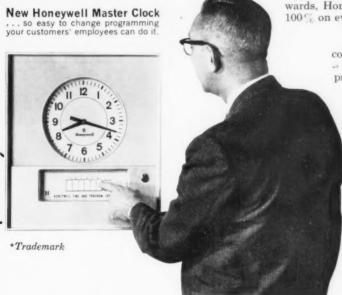
Honeywell's unequaled service facilities assure prompt delivery exactly when you need it. Honeywell wiring diagrams are so accurate and easy to follow they're often called "best in the business." And you can always phone a nearby Honeywell Application Engineer if you should need help. Afterwards, Honeywell Maintenance men back you up 100% on every clock.

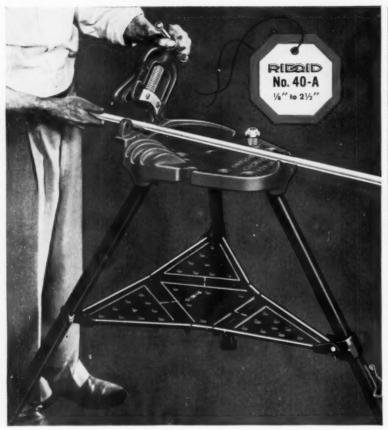
Phone your nearest Honeywell office for complete information on Honeywell's new ClockMaster System. Or, if you prefer, write Honeywell, Dept. EC-9-164, Minneapolis 8, Minnesota. In Canada, write: Honeywell Controls, Limited, Toronto 17, Ontario.

### Honeywell



HONEYWELL INTERNATIONAL. Sales and service offices in all principal cities of the world. Manufacturing in the United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.







Here's a solid workbench to speed all cutting, threading and reaming out on the job. No other vise offers as many work-saving features as this No. 40-A Tristand Yoke Vise. • Big, rugged malleable vise base has 3 bending grooves, 6 tool slots, rear pipe rest and a ceiling brace screw for absolute rigidity if legs aren't bolted down. • Base overhangs front legs for clear tool swing. • Extra-large yoke latch opens for easy, fast insertion of long pipe lengths. · Replaceable LonGrip jaws give, slip-proof grip. • Handy tool tray locks legs open during use but folds for easy carrying with legs snap-chained together. No. 450 Tristand Chain Vise with 1/6" to 5" capacity is also available.

Call your Distributor today. For your convenience, he maintains a complete stock of PALEDID Work-Saver Pipe Tools and parts.





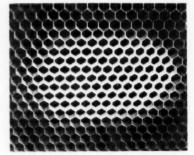
Portable Load Center

lightweight, self-contained 120/240-volt, ac, portable utility distribution center of 50-amp capacity with overload and short-circuit protection has been announced. The 30-lb unit can be set up by one man at the construction site. Designed for use wherever construction sites or field test projects require temporary power, the load center contains six 15-amp, 120volt outlets for power tools, and one 20-amp 2-pole, 240-volt outlet which can be used for welding, etc. Distribution centers can be cascaded or inter-connected by means of heavy-duty 4-wire receptacles located on each end of the main bus. Over-all size is 28 by 10 by 10 in.; height on legs is 36 in. Unit also can be provided in 100-amp capacity, and also with weatherproof construction.

Leonard Electric Manufacturing Co., 3907 Perkins Ave., Cleveland

14. Ohio

in Use



Ceiling Panel

A new steel illuminated ceiling panel, called Metacel, has been announced. It is hexagonal in design and constructed of one continuous piece of steel. Metal thickness is 0.0083 tin mill black plate steel. Cell sizes are § in. hexagonal. Panel sizes are 2 by 4 ft, 2 by 3 ft, 2 by 2 ft, 2 by 1 ft, 1 by 3 ft and 1 by 1 ft. Recommended for commercial installations where maintenance is a

John J. Fannon Products Co., Division of Hupp Corp., 3000 East Woodbridge, Detroit 7, Mich.

A new electrical insulation putty known as Slipknot filler tape, which molds under finger pressure to make a completely homogeneous mass of insulation around connectors on cables and wires, has been announced. With a dielectric strength of 500 volts per mil, the tape is 125 mils (\frac{1}{5} in.) thick. It is packed in 1\frac{1}{2}-in. wide rolls, 60 in. long, with parchment paper separator. Tape is black.

Plymouth Rubber Co., Inc., Canton, Mass.

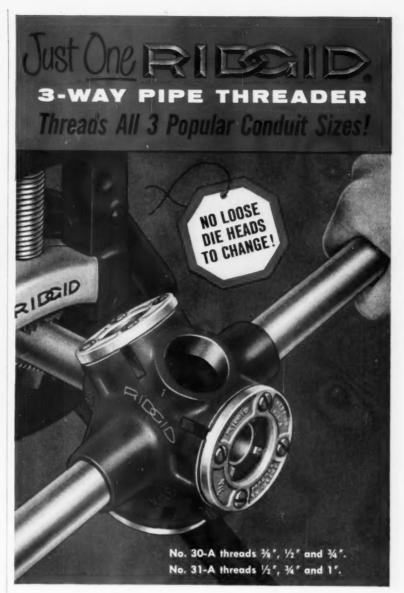


#### Switchboard

(17

new-design, free-standing metering switchboard is for electrical distribution systems in apartment and office buildings or any multiple-unit structures separate metering is required. Each section of the new Uni-Power metering switchboard is a self-contained, free-standing unit on which meters may be mounted front and back. Each section measures 32 in. wide, 13½ in. deep and 77½ in. high. Main or primary sections comprise a main disconnect and up to 18 each of meter bases and distribution disconnects. When additional meters are required, distribution sections —each incorporating up to 24 meters—can be added. Main sections may be obtained with meters back and front, on one side only, or without meters. Distribution sections also are available with meters back and front, on one side, or with main lugs only. Main disconnects can be 2- or 3-pole fused switches or circuit breakers, rated from 225 to 1200 amps. Distribution disconnects are 15- through 100-amp circuit breakers.

I-T-E Circuit Breaker Co., Walker Div., P. O. Box 2384, Atlanta 18, Ga.



Here's an extra-sturdy threader that's instantly ready to thread any of the three conduit sizes most used. Each die-set is locked in place...can't get lost. Yet dies are easy to reverse for close-to-wall threading. Centering guide keeps conduit straight for true-threads every time. Twin handles double leverage for easy thread cutting. Choice of long-wearing alloy or high-speed steel dies. Straight conduit dies also available.

Call your distributor today. For your convenience he maintains a complete stock of RED Work-Saver Pipe Tools and parts.





#### Luminaries

(18)

New contemporary opal luminaires are designed for all outdoor or indoor locations. The white opal glass spreads evenly diffused light down and out in a wide pattern to illuminate porches, walks, entrances, carports, breezeways and other areas. The line is especially effective for architectural installations since all fixtures can be used with 100-, 150- or 200-watt lamps. Included in the complete line are 1- and 2-light units for wall, ceiling or custom pendant mounting.

Stonco Electric Products Company, 333 Monroe Ave., Kenilworth, N. J.

#### Receptacles (19

A full line of E-Z wire receptacles with pressure-spring back wiring, built to specification grade, has been announced. Strip wires and push them into the E-Z wire pressure terminals for insured connections; to release, press down in slot with screwdriver. Receptacles take from No. 10 to No. 14 wire. Each terminal permits two connections for continuous wiring and all contacts are double-wipe "T" type. Mounting strap has wide plaster ears. Listed by UL. Duplex flush, T-slot duplex and parallel-ground duplex receptacles are rated 15amp, 125-volt. The tandem-ground duplex receptacle is 250-volt.

Eagle Electric Mfg. Co., Inc., 2310 Bridge Plaza South, Long Island City 1, N. Y.

#### Switches (20)

Designed primarily for air conditioning and heating installations, new maintained-contact ac switches can also be used for the alternate control of any two motors, or for any applications which require heavy-duty ac double-throw, center "off" switch controls. The "off"

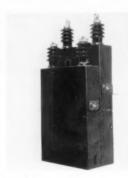
position is at center of handle throw with two circuits being energized at either end. A fiber insulating wrap-around is assembled under switch cover and can be folded down over terminals to protect wiring when switch is installed in small enclosures. Control is either by standard toggle or lock type handle, both fit openings in standard wall plates. Available in single or double pole, each with brown, ivory or lock type handle.

Pass & Seymour, Inc., Solvay Station, Syracuse 9, N. Y.

#### Scanner (21)

Type PE-1 photoelectric scanner system provides positive response when the light-beam is interrupted by objects as small as 1-in. wide at counting rates up to 500 per minute. Depending on light source and photocell used, operating ranges can be up to 8 ft. Using a powertype photocell with high infrared sensitivity, and with a filter to minimize the effect of ambient visible light, this system operates a dc relay without need for amplifiers of any kind. The relay of this system is a plastic-cased, plug-in unit having two sets of single-pole single-throw load contacts, one normally open and the other normally closed. Contacts are rated 8 amps, 115 volts ac, non-inductive. Bulletin PE-1 is available.

Farmer Electric Products Co., Inc., 2300 Washington St., Newton Lower Falls. Mass.



#### Capacitors

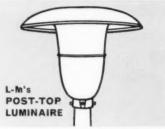
(22)

New 50-kvar capacitors featuring a reduction in weight from 91 to 70 lbs are available. Tank dimensions are 4 by  $13\frac{1}{2}$  by  $20\frac{1}{2}$  in. high. Units are rated 2.4 to 14.4 kv. Features are liquid circulation and improved pack design. The 100-kvar capacitors will retain the  $15\frac{5}{2}$ -in. mounting dimensions.

Line Material Industries, Mc-Graw-Edison Co., Milwaukee 1, Wis.



Three styles, for driveways, terraces, walks, parks—wherever soft, efficient low-level lighting is desired. All-aluminum weatherproof design with utility outlet; simple; efficient; quality lighting up to 150 watts incandescent. Six decorator colors and brushed aluminum.



—is an optically efficient, extremely adaptable unit for street lighting, parks, playgrounds, motels, pools, parking areas. Makes conversion extremely simple and economical. Choice of seven IES light patterns; six decorator colors or brushed aluminum; mercury, with ballast; or incandescent; photocontrol if desired.



luminaire, with built-in ballast; highly efficient for street and highway lighting; many convenience and safety features. Ask for bulletin.



In two and four light single, double units, for area, ramp, street, and underpass lighting. Also available with L-M's exclusive Peltier thermo-electric cooling for highest efficiency.

FLUORESCENT FIXTURES

#### L-M SUBURBANAIRE

Designed for neighborhood streets, suburban and rural areas. In incandescent or mercury, with open type borosilicate glass refractor in choice of light patterns.





Industries
McGRAW-EDISON

COMPANY

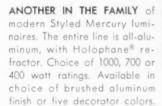
525

Outdoor Lightin



ADDED BEAUTY FOR LOCATIONS like this. The Styled Mercury unit directs the light downwards and eliminates glare. It illuminates 11,000 square

feet to 3 footcandles. You need fewer and shorter poles, and less wiring, to get the desired level of light.



FOUR OF THE LATEST design units provide excellent nighttime illumination for traffic and pedestrians on this busy street in a shopping section.



### L-M Announces Another Graceful Design In The New Styled Mercury Light Family

Line Material's Styled Mercury luminaires are a family of high quality, high intensity lighting units. The latest addition to the Styled Mercury line is the upsweep design installed in the welllighted street shown above.

These are large, handsome luminaires, styled for Line Material by a noted industrial designer. They will contribute daytime beauty and excellent nighttime lighting to any street, park, mall, public square, or parking area.

Line Material is a leading manufacturer of outdoor lighting designed specifically for the application. L-M also provides competent Lighting Application Service by experienced lighting engineers, available through Authorized L-M Distributors.

GET COMPLETE INFORMATION

Ask your Authorized L-M Distributor for bulletins, or mail the coupon.





### INE MATERIAL Industries McGRAW-EDISON COMPANY



Address

DISTRIBUTION TRANSFORMERS . RECLOSERS, SECTIONALIZERS AND OIL SWITCHES FUSE CUTOUTS AND FUSE LINKS . LIGHTNING ARRESTERS . POWER SWITCHING EQUIPMENT PACKAGED SUBSTATIONS . CAPACITORS . REGULATORS . OUTDOOR LIGHTING LINE CONSTRUCTION MATERIALS . PORCELAIN INSULATORS . FIBRE PIPE AND CONDUIT

Line Material Industries, Milwaukee 1, Wisconsin

Please send me details on L-M Styled Mercury family of luminaires, and name of nearest distributor. FCM-91

Company\_

\_State\_ Type of Area To Be Lighted\_

## This is the little fella



### that cut starter failures by 98%

See it? That condenser up there isn't paper (the usual thing), but *ceramic*. It's in every Sylvania starter and the difference it makes in performance will surprise you.

A two-year test in one manufacturing plant showed Sylvania fluorescent starters had only 1 failure out of 340 starters. Conventional starters with paper condensers had 51 failures out of 330 starters.

Paper can't stand up as well to heat, cold, moisture. Ceramic condensers do. Another reason why Sylvania alone can give you an exclusive Certified Performance Policy guaranteeing: "If at any time, in your opinion, any Sylvania Fluorescent Starter fails to give satisfactory service during the 12 months from date of purchase, it may be returned to the supplier for full refund of purchase price."

Yes, Sylvania lowers your TCL (Total Cost of Lighting). That means lower cost of lamp plus power plus MAINTENANCE. Try Sylvania next time you need starters!

### SYLVANIA

GENERAL TELEPHONE & ELECTRONICS

Lighting Division, Sylvania Electric Products Inc., Dept. 15, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., Montreal.



Fitting (23)

Shielded controls and threaded construction throughout provide protection for wiring housed in these explosion-proof. dust-ignition-proof and raintight fittings. They are identified as EW Series Pylets. They are available with various standard wiring devices including tumbler switches, manual motor starters, pushbutton stations, selector switches and pilot lights. All operating controls have a threaded stainless steel shaft and are mounted on front face of body. Bodies are regularly tapped at top and bottom for 1- to 1-in. conduit. Back and both sides can also be tapped up to 1 in. when specified. Bulletin is available.

Pyle-National Company, 1334 N. Kostner Ave., Chicago 51, Ill.

#### Photoelectric Units (24)

"Modulite" protective units use a modulated (pulsating) light beam to detect the presence of a machine operator's hand or arm in a high-danger area. A special rotating disc modulates the light. The photoelectric receiver is "tuned" to the modulated-light frequency. In use, the interruption of the beam causes a signal that will stop a machine. A choice of projectors is offered with 1- or 2-in. light beams having ranges up to 20 and 80 ft, respectively.

Clark Controller Company, 1146 East 152d St., Cleveland 10, Ohio

#### Pipe Pusher (25)

New heavy-duty Pow-r Mole was designed to push rod in any condition where pushing is possible and pull ½- to 3½-in. dia. copper, steel, plastic pipe or tubing underground. It attaches to most standard tractor- mounted hydraulic back hoes. Unit comes complete with full set

of cribbing, 50-ft push rod, and pusher cap. Direction can be reversed by changing position of two drag springs with no need to turn pusher around. Unit has a 5-in. stroke and operates at a force of up to 35 tons.

Pow-r Devices, Inc., Clarence Center Road, Clarence Center, N. Y.

#### Cable (26)

Polyflex is standard non-metallic sheathed cable made with Walkersyn Type TW conductors and overall thermoplastic jacket. It is designed for open or concealed lighting and power circuits in reasonably dry locations. It is also used for interior wiring in homes, stores, shops, private garages, rural buildings, and for major appliance circuits. Listed by UL.

Walker Brothers, Conshohocken,



#### Light and Ladder

(27)

A new underwater light and pool ladder combination, called Ladda-Lite, has been developed. The light is hung from the bottom step of the ladder. Ladda-Lites are available in the following styles: straight or sloping ladders in either chrome or stainless steel, 3-step and 4-step sizes; 500-watt Slim-Lite or Slim-Lite 12, a 12-volt, 300-watt light. Each package includes complete ladder with frames, steps, bolts and bumpers; complete light with electric cord and, for 12-volt lights, a special transformer. Also included are brackets to hang the lights, a plastic shield which is installed in front of light and chrome-plated brass conduit which goes between light and ladder frame. Also a weatherproof female receptacle with a 3-prong locking male plug, a chrome-plated shield for the receptacle and all necessary screws and nuts.

Paragon Swimming Pool Co., Inc., Pleasantville, N. Y.



### you'd still get more light with Sylvania VHO Powertubes!



Or you could get 21/2 times more light with the same number of fixtures you now have! Sylvania VHO (Very High Output) Powertubes are that much brighter than standard fluorescents. Yet they're only 11/2" in diameter. Light in weight. Easy to maintain (smooth tubular surface doesn't have nooks and crannies to catch dust which dims light).

And every one comes with this exclusive money-back guarantee: "If at any time a Sylvania Fluorescent Lamp fails in your opinion to provide better performance than any other brand fluorescent lamps, on the basis of uniformity of

performance, uniformity of appearance, maintained brightness and life, it may be returned to the supplier for full refund of purchase price."

Only Sylvania gives you this Certified Performance Policy. It's your assurance of lowest TCL (Total Cost of Lighting), which means cost of lamps plus power plus maintenance. Get the pluses Sylvania offers. Call your representative now. Or write Lighting Division, Sylvania Electric Products Inc., Dept. 15 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., Montreal.



Subsidiary of GENERAL TELEPHONE & ELECTRONICS





Available from your Electrical Wholesaler



flector, concentrating end lens and many

other optional features available. Most

models also available with new "safety

Write for McGill Electrical Specialties Catalog No. 84.



McGill Manufacturing Co., Inc., Electrical Div., 450 N. Campbell St., Valparaiso, Indiana



#### **Junction Boxes**

(28)

A complete series of explosion-proof junction boxes with lens covers has been announced. The "GR" line includes copper-free, cast aluminum enclosures in eight sizes and are adaptable for housing meters, gauges, and instruments. All standard assemblies are supplied with two mounting lugs. Special brackets for mounting devices can also be furnished.

Killark Electric Manufacturing Co., 3940 Easton Ave., St. Louis 13,

Mo.

#### Covers

(29)

New spring door and locking covers for FS boxes and switch boxes, makes any duplex outlet—T Slot, parallel, 3-wire grounding, polarized or Turnlock—a weather-proof outlet. When one half of outlet is in use, the other half is closed securely. Covers close automatically when caps are removed. Any padlock can be used to lock both covers in place. As long as padlock is in place, center screw is inaccessible and cover cannot be removed.

Pass & Seymour, Inc., Solvay Station, Suracuse 9, N. Y.

#### Pipe Threader

(30)

The "Amaz-O-Thread" die spinner is for on-the-spot pipe threading in sizes from ½ in. to 2 in. It is constructed of aluminum, weighing 18½ lb, and has ball bearings on all moving parts. This device will operate with either standard Ridgid No. 12-R dies or Nye No. N12-6 dies, and can be plugged in anywhere using 110 volts. Adapters available for 00-R and 111-R dies. Also for Ridgid No. 4-P geared dies for 2½-in. through 4-in. pipe.

"Amaz-O-Thread" Sales Co., P. O. Box 39752, Los Angeles 39, Calif.

#### Cable-Tray System

(31)"Ladder-Way" is a new tray supporting system for insulated power cables, featuring a vertical plane elbow. Elbows are factory-assembled and shipped as straight, rather than curved pieces. Elbow side members are composed of flat links with rolled edges and are secured together by special Tinnerman fasteners. A fastener is inserted through the proper one of three notches in each link and through a single bolt hole in opposite end of adjoining link. Standard straight sections are 10 ft long with an inside depth of 3 in. Rungs have rounded edges, and rung spacings

well as various tray widths. H. K. Porter Company, Inc., Delta-Star Electric Div., Chicago, Ill.

of 4, 8, 12 or 16 in, are available as

#### Lighting Unit

An illuminated hand rail, called Lumi-Rail, is designed for lighting of stairways and passageways. Made of cast and extruded aluminum construction with acrylic shielding media, it is available in aluminum or bronze finishes. Unit can be installed indoors or outside on level or angling surfaces.

Ender-Monarch Corp., Garfield,



#### **Time Control**

New 47007-SZ Series, 24-hour "Astro-Dial" time control for lighting applications. The control requires one setting and thereafter will turn lights "on" in relation to sunset and "off" at any pre-selected time with no further adjustment for seasonal changes. It is for use with incandescent, mercury-vapor or neon used for illuminating signs, billboards, show windows, parking lots and other lighting applications. Switching mechanism and capacity: 4-pole single throw, 4 NO isolated contacts, 20-amp T-rated, 120 or 208-240 volts, 690va pilot duty.

Paragon Electric Company, Inc., Two Rivers, Wis.

#### SO EASY TO HANDLE

WB DYNAPRENE PORTABLE CORD

Smaller sizes are packed on spools in cartons . . . Larger sizes in coils, in knockout cartons . . . Easy to identify anywhere . . . Type, size and gage, clearly marked on jacket . . . Safe to recommend . . . Premium quality, long lasting, oil-resistant, neoprene jacket ... U.L. approved.

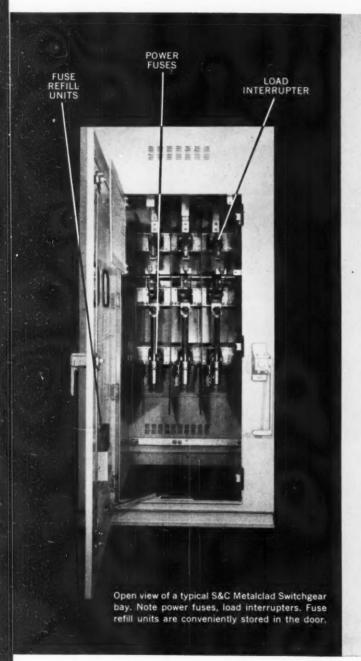


Write for free Catalog PC-58 "Portable Cord and Cable"

NEW HAVEN 14, CONNECTICUT / Telephone CHestnut 8-5515 / TWX: NH 84



# Reclosing is for the birds



So why buy this feature in your 2.4 thru 14.4-kv switchgear?

Reclosing is for the birds, squirrels, tree limbs, lightning, icing, windstorms, and kite strings that frequently cause non-persistent faults on open distribution lines of utility systems. Reclosing re-energizes the lines to restore service in a fraction of a minute.

But when faults occur on the enclosed power supply circuits of industrial plants, commercial and institutional buildings, you don't want to reclose on them. These faults—while extremely rare—are permanent. Someone has to locate the trouble and repair the equipment or cable—or at least isolate it—before the system can be reenergized. So why buy expensive circuit breaker type switchgear with its automatic reclosing feature?

S&C Metalclad Switchgear—employing fused load interrupters—gives the ideal protection for enclosed power supply circuits. Power fuses furnish the fault protection (load interrupters switch the load). After a fault occurs, you simply replace the inexpensive fuse refill unit (typically costing \$13.50) while the fault is being located and corrected.

The economics all say, "Reclosing is for the birds." Why pay for a function you can't use?

Cut your high-voltage switchgear costs in half by specifying S&C Metalclad Switchgear for your 2.4 thru 14.4-kv switching centers, service entrances, substation primaries and secondaries. Get full-load switching to 1200 amperes and fault interrupting to 500,000 kva.

See the Yellow Pages (Electrical Equipment) for your nearest S&C sales engineer. Or write to:

S&C Metalclad Switchgear meets all NEC requirements for fault-closing, short-circuit interruption. Performance proved by high-power testing at KEMA laboratories.



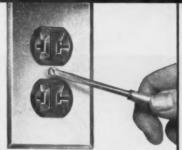
S&C ELECTRIC COMPANY

4433 Ravenswood Avenue - Chicago 40, Illinois Specialists in High Voltage Circuit Interruption since 1911

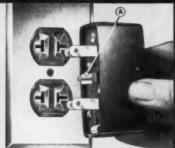


The equipment is an S&C Metalclad Switchgear Assembly rated 13.8 kv, for a switching center. The bird, a green-winged macaw, is an optional extra, obtainable at your local petshop.

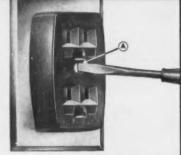




Hubbell Duplex Adapter No. 5291 is easy to attach. Just remove screw holding metal or plastic plate to 2-wire receptacle. Leave plate in place.



Adapter plugs into 2-wire receptacle. Screw A will go through plate to grounded box. It is connected to both U-slots of adapter.



Tightening Screw A establishes adapter ground in a grounded system. If the system is ungrounded, connect adapter as shown at right.



When an existing system is not properly grounded, the adapter may be grounded by connecting a grounded wire to green hex Screw 8.

#### FAST TEMPORARY CONVERSION TO 3-WIRE GROUNDING SAFETY

This polarized, plug-in adapter converts 2-wire duplex receptacles used with grounded or ungrounded systems to temporary 3-wire grounding receptacles. Landlords find it a great convenience when tenants requiring 3-wire facilities cannot postpone occupancy until rewiring is completed.

To make a conversion, nothing in the existing system has to be removed except receptacle cover-plate screws, to make room for a captive screw in each adapter. This captive screw acts as a conductor from

the two U-slots to the grounded system. For use with receptacles in ungrounded systems, there is a green binding screw to permit connection of an independent ground wire. Either way, the electrically independent blades and contacts continue existing split circuits.

The polarized adapter operates in any parallel or T-slot duplex receptacle with metal or plastic cover plates. Brown or ivorine bakelite, for 15 amperes, 125 volts. Size: 1.4" from plate, 3.3" high, 1.75" wide.

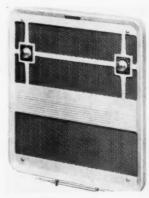
HARVEY





INCORPORATED

Bridgeport 2, Connecticut



#### **Heating Equipment**

(34)

Totally enclosed stainless steel finned heating elements have been engineered into a new line of fanforced wall Heetaires, Series H360 and H370. Designed for hard-toheat rooms and buildings, units contain lifetime sealed-bearing motors. They have a heavy-duty hydraulic snap-action thermostat. Units feature safety controls that automatically break the circuit if air supply is obstructed in any way. Safety switches automatically reset. Heavy-duty wall Heetaires are available in 2000-, 3000- and 4000watt units. Literature is available.

Markel Electric Products, Inc. and LaSalle Products, Inc., Buffalo, N. Y.

#### Current Transformer

(35)

transformers. Current Type EMC, designed for high-current metering and relaying on low-voltage systems are offered in single or double ratios. The EMC is a 600-volt class window-type unit in current ratings of 800 to 4000 amps. It has four mounting holes that go through the transformer, one in each corner. It can be flush-mounted to a flat surface for either a vertical bus coming up through a platform or a horizontal bus extending through a wall or panel. Dual ratio units are offered in either 3- or 4-terminal arrangements.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

#### Scaffold

(36)

A new scaffold, called Versa-Crane, is completely collapsible and may be loaded onto a pair of platform trucks for self-transporting. It is constructed of several independent units in such a way that each section may be used individually when desired. In addition, its

platform scaffold may be raised or lowered with all equipment on it. Component sections are-two platform trucks with 4-position lock. ball-bearing casters; four independent ladders; two ladders which mount on truck and connect at top by a saddle to form a mobile ladder; an L-Beam fixed to saddles of two rolling ladders and equipped with a 1-ton chain block converts unit into a Gantry crane; a gripstrut safety platform mounts on ladders to complete VersaCrane. Unit adjusts from 32 in, above floor to a height of 12 ft 2 in.

W. B. McGuire Engineering Co., Ltd., P. O. Box 265, Champlain, N. Y.

#### Control

(37

A new sequence control for electric heating. In the control, a switching circuit ties together a number of 5-kw load modules to form a single unit. The modules consist of a load switch and two transfer switches that are operated by thermal expansion rods. Electric circuit is such that the current in the thermostat remains at a low uniform value to insure stable anticipation regardless of the number of heat banks in operation. A switch for the blower is tied to the first module, making the blower first on and last off. Load switches control heat banks.

Controls Company of America, Heating and Air Conditioning Div., 2450 North 32d St., Milwaukee 45, Wis.

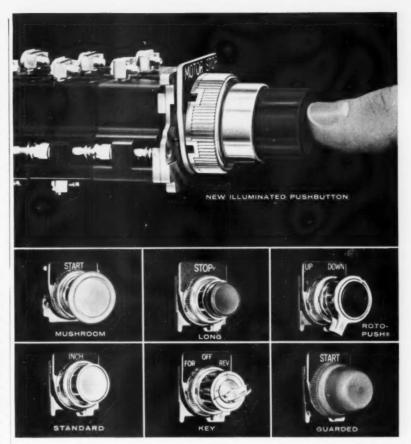


#### Lamps

(38)

Two new lamps have been developed for underwater lighting. They are a 300-watt, 12-volt R40 and G30 operated from a suitable isolating transformer. The G30 is supplied with a medium screw base. The R40, complete with an internal reflector, is available with a medium screw or mogul screw base. Either lamp can be mounted in a watertight, recessed fixture in pool walls.

Radiant Lamp Corp., 300 Jelliff Ave., Newark, N. J.



### New Cutler-Hammer oiltight pushbuttons give more circuit flexibility

Now you can make any pushbutton station you want from this new complete line of operators.

#### MORE THAN 30 DIFFERENT CIRCUIT ARRANGEMENTS

You can get these pushbuttons in one-hole or base mounting, six different colors. You can get more than thirty different circuit arrangements . . . hundreds of varieties of stations in standard arrangements of up to 25 elements. And you can get up to 8 circuits on one pushbutton. Flexible oil resistant diaphragm behind the button is designed to stay soft and pliable.

USE 40% LESS BEHIND-PANEL SPACE

This new Cutler-Hammer oiltight line gives you more control in less space because they use 40% less behind-the-panel space than the next smallest unit.

A colorful brochure, "MASTER DESIGN" will give you all the facts. Ask for Pub. LO-104-T241.

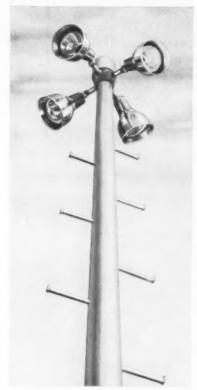
These new pushbuttons that give far greater circuit flexibility than any other make are the kind of improvements you can expect from Cutler-Hammer. Give your local sales office or distributor a call.

WHAT'S NEW? ASK ...

#### **CUTLER-HAMMER**

Cutter-Nammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiery: Cutter Hammer International, C. A. a. Associators: Cutter-Hammer Canada, Ltd.: Cutter-Hammer Mexicana, S. A.





#### **ABSOLUTELY** NO MAINTENANCE

You are looking at Stonco sealedbeam mercury vapor floodlights.

Hermetically sealed inside each lamp is a brilliant silvered reflector.

The reflector stays brilliant because nothing ever touches it. Not dust, dirt or grime. Not even smoke, soot or chemicals in hazardous areas.

You climb the pole only to change lamps. This could easily be once every five years. Probably longer.

(Conventional floodlight reflectors lose up to 15% efficiency if not cleaned every three months.)

What do you want from a mercury vapor floodlight? Higher lumen output? Longer lamp life? Lower power consumption?

Stonco sealed-beam mercury vapor gives you all of this, at far less cost. Plus . . .

Absolutely no maintenance.



 Write for Catalog MV
 1961 STONCO ELECTRIC PRODUCTS CO. KENILWORTH, NEW JERSEY



#### Elevated Flooring (39)

Strato-Floor is a new type of elevated flooring particularly designed for use in electronic computer installations, or wherever extensive cabling and wiring systems require under-the-floor space and immediate accessibility. Modular 24 by 24 in, panels are made of plastic molded-around cross-laminated plywood. Sub-structure is an engineered grid support system. Steel stringers are bolted to a new kind of adjustable jack. Floor is designed to support a live load of 250 lb per sq ft, and a point load of 1000 lbs.

Strato-Floor, Inc., 795 East 152nd St., Cleveland 10, Ohio

#### Lamps (40)

Two designs are available in a new square fluorescent lamp. One has a waffle shape on the front and the other one shows the labyrinthine path of the current forming the discharge which results in the fluorescent light. Both types are 9 in. square so that they will fit directly into all existing 9-in. recessed incandescent fixtures, requiring only the addition of an instant-starting ballast. Their design life is 10,000 hours. Lamp is less than 2-in. thick.

Interlectric Div., El-Tronics, Inc., Warren, Pa.

#### Transformers (41)

Primary - service pad - mounted transformers (PSP) designed for residential underground distribution on grounded wye loop or dualfeed systems in primary voltages up to 15 kv are offered. Complete package of transformation protection and switching equipment is available in single-phase units, 10 to 167 kva. The PSP unit consists of three main components: a transformer compartment, a detachable high- and low-voltage terminal compartment, and a removable cover that provides complete isolation of all electrical connections and tank hardware. All three assemblies interlock.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

An adjustable sequencing programmer employing a rotating-cam limit switch with its own adjustable-speed drive motor is available. Unit allows individual adjustment of 30 circuits through the use of micro-adjust split-lobe cams. By loosening a screw and rotating the cams relative to each other, a continuous range of an open and closed contact can be obtained from 352° down to approximately 8° of a revolution of the input shaft. The adjustable-speed drive motor facilitates changes in speed while cams are in motion. The adjustment dial enables unit to be adjusted before mounting and provides a reference if changes in programming are desired. Single-pole, double-throw, snap-action switches are used and have one normally opened and one normally closed contact which are electrically separate. Switches are rated at 5 amps, 440 volts, ac; 10 amps, 220 volts and 15 amps, 115 volts ac. Available in NEMA Type 1, 4, 7, 9 and 12 enclosures.

Gemco Electric Co., 25685 West Eight Mile, Detroit 40, Mich.

#### Cable (43)

A new service entrance cable with Vulkene insulation that doubles the life expectancy of the cable. Vulkene is a thermosetting, rubberlike insulation of chemically crosslinked polyethylene that combines the electrical and moisture-resistant properties of polyethylene with physical and heat-resistant properties. Vulkene-insulated singles require no braids or other coverings for protection against weather or sunlight at the termination. Listed by UL as Type SE Style U for installation in accordance with the NEC.

General Electric Company, Chemical and Metallurgical Div., Bridgeport 2, Conn.

#### Scaffold Accessory (43a)

An accessory is now available for supporting materials above the normal height of floor scaffolds. Known as Hold-A-Load, the support telescopes and locks into Baker scaffold end frames. The top sections can be adjusted to desired height by a thumb set screw in the lower locking sections. Two types of heads are available: a "T" head for lighting fixtures and flat equipment; and a "Y" head for conduit, piping, duct work, etc.

Baker-Roos, Inc., 602 W. Mc-Carty St., Indianapolis 6, Ind.

#### **Product Briefs**

(44) General Electric Co., Low Voltage Switchgear Dept., Philadelphia, Pa., has announced a new line of silicon dc power supplies available in ratings from 0.75 to 75 kw... (45) New distribution-class, valve-type lightning arresters, designated Type E5 direct connected and T5 externally gapped, in standard voltage ratings of 1 through 20 kv, are now available from Line Material Industries, McGraw-Edison Co., Milwaukee, Wis.

(46) Newman Electric Motors, Inc., Newark, N. J., has expanded its line of DK Series single-phase motors with the addition of a 5 hp, 1800-rpm unit. . . . (47) A higher minimum flash point for "Diala" oil AX, an electrical insulating oil for large transformers and high output electrical equipment, has been announced by Shell Oil Co., New York, N. Y.

(48) Anaconda Wire and Cable Co., New York, N. Y., has introduced a new ATRC cable especially designed for use in telemetering, automatic relays, communications circuits and supervisory control systems. . . . (49) Arrow-Hart & Hegeman Electric Co., Hartford, Conn., announces that many switches, receptacle and wall plates in their line of wiring devices are now available in neutral gray plastic.

(50) Sylvania Electric Products Inc., New York, N. Y., announced the development of a fluorescent lamp designed to improve certain growth aspects of plants through specific spectral energy distribution. . . . (51) A UL listed, "SCR" dimmer available in 3-, 4-, 5-, 6-, 10- and 12-kw capacities has been announced by Kliegl Bros., New York, N. Y.

(52) Anaconda Wire and Cable Co., Hastings-on-Hudson, N. Y., has been granted a patent on their end-closure for cable-enclosing pipes.... (53) New connectors for back-to-back mounting of electrical boxes has been introduced by Quicktime Electrical Products, Chicago, Ill.

(54) Emerson Electric Co., St. Louis, Mo., has announced their new Emerson-Imperial lighting fixture line designated "Trendlighting."... (55) A new "Unifilm 100" power capacitor weighing only 132 lb and occupying 2050 cu in., has

Rules and Regulations Relating to the Use of Submersible Lighting for Swimming Pools, Reflector Pools and Display Fountains.

#### Bulletin No. 17

17.1 General—Effective as of this date, the use of 120-volt lamps when assembled in submersible lighting units, for the illumination of swimming pools, reflector pools or display fountains, whether they are intended for side wall or pedestal mounting, is hereby prohibited.

17.2 Voltage—The permissible voltage that may be applied to lamps used for such application shall not

exceed 12 volts.

17.3 Transformers—a. Step-down transformers used in conjunction with such lighting units shall be of the two-winding, isolating type and having a grounded metallic shield between the primary and secondary windings to prevent accidental contact between windings under fault conditions. b. Transformers shall be located remotely from the lighting units which they supply, and overcurrent protection shall be provided in both primary and secondary windings.

17.4 Swimming pools, reflector pools, or display fountains presently



### **LIFESAVER**

Underwater lighting is serious business.

Deadly serious.

Cutting corners can cost lives.

Precisely why the Stonco line is solid cast bronze. Porosity-tested. With a special low voltage transformer for safety plus.

(We've tamed the high voltage. Isolated it with a grounded shield that stops cross-over from primary to secondary. Harnessed it with a fuse factory-sealed to guard against do-it-yourself electricians.)

Even the deck box is gasketed watertight fore and aft. Keeps wiring bone dry. From surface slop, seeping water, or pool overflow caused by flash floods.

No wonder Stonco submarine lighting meets all the safety codes. Incidentally, even our fountain lights are available low voltage.

Fish have to live too.

lighting



\* Pat. Pending

Now, one more of your big costly installation problems is eliminated... no more wasted time in cleaning concrete out of tapped holes! "ARO-GARD", Arrow Conduit's new protective plastic compound, covers tapped holes during manufacturing process. "ARO-GARD" is hard enough to keep concrete out of tapped holes —yet soft enough to allow screw to penetrate protective film with ease.

"ARO-GARD" is easily identified by green color (see shaded area in illus.). Now available on all Arrow Conduit Concrete Rings, at NO ADDITIONAL COST TO YOU.

Write for samples and data of "ARO-GARD" application process.

New Products from Arrow Conduit help you keep pace with modern wiring needs.

OUTLET BOXES . GANG BOXES .

& FITTINGS CORP.

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\*DIFFOIT 2, MICH \* GREENBERGE, MC. \* \*LOS ANGELES,
CALIF. \* \*INIAIN\_! (CDERG. \* NEW DELENA, LA.
\*\*MEW YORK CIT! M. \* NEWTON CENTRE, MASS.
\*ACTIVE, MASS. \* \$1, MICHO \* BOOKERIER, H.\*
\*\*SEATTLE, MASS. \* \$1, MICHO \* \* SOCRETIER, H.\*

been introduced by General Electric's Capacitor Dept., Hudson Falls, N. Y.

(56) Kaiser Aluminum & Chemical Corp., Oakland, Calif., has announced an improved aluminum electrical conduit, called "Kingfisher" rigid aluminum conduit, featuring an interior coating with a high silicone content. . . . (57) Four new designs of butyl-molded high current instrument transformers for 5000, 8700 and 15,000-volt service in ratings from 1200 to 4000 amps are now available from General Electric Co., Schenectady, N.Y.

(58) Wesco Furnace Div., Northwest Foundry & Furnace Co., Portland, Ore., has announced an electric duct furnace installed in the air duct in sizes 10, 15 and 20 kw producing 34,150 to 68,330 Btu. . . . (59) A line of 830-volt outdoor capacitors for electrified pumping rated from 2 to 6 kvar is available from Westinghouse Electric Corp., Pittsburgh, Pa.

(60) Universal Manufacturing Corp., Paterson, N.J., has announced that all Universal "service guaranteed" ballasts CBM certified by ETL for use with 40-watt rapid start lamps are now "A" sound rated. . . . (61) New pushbutton series in one, two, four and eight button sizes in the new blue-biege color are now available from Suttle Equipment Corp., Chicago, Ill.

(62) Plymouth Rubber Co., Inc., Canton, Mass., has added two smaller sizes to their "Flip-N-Cut" instant dispenser-cutter for slip-knot plastic electrical tape—a 44-ft and a 30-ft roll. . . . (63) The all-new Ettco-Flex non-metallic sheathed cable (Type NM) now plastic jacketed is available from Ettco Wire & Cable Corp., Brooklyn, N.Y.

(64) Sierra Electric Corp., Gardena, Calif., has added a line of narrow plates in seven widths from  $1\frac{3}{8}$ -in. to  $2\frac{1}{2}$ -in. . . . (65) A new 100-hp dual-belt unit has been added to complete line of Varidrives now ranging from  $\frac{1}{4}$  to 100 hp, with units of 50, 60 and 75 hp in the dual-belt design by U.S. Electrical Motors, Inc., Los Angeles, Calif.

(66) Sylvania Electric Products, Inc., New York, N.Y., is now manufacturing an airport lighting fixture of heavy-impact design.

### Catalogs & Bulletins

(67) LIGHTING. "Steel Lighting Standards," 28 pages, contains photos and specifications on Weld-Rite standards for lighting freeways, streets, parking lots, etc.; and "Flood Lighting Poles," 12 pages, covers poles for stadiums, playgrounds, driving ranges and security areas. Weld-Rite Co.

(68) Infrared Equipment. Brochure describes new techniques, using fluid cooling, now making possible very compact quartz lamp ovens and furnaces with extremely high heat-transfer rates. Fostoria Corp.

(69) CIRCUIT BREAKERS. A handy selector disc permits quick determination of physical and electrical characteristics of six basic types of breakers. Westinghouse Electric Corp., Standard Control Div.

(70) CEILING PANELS. 4-page brochure describes the design of luminous ceilings with metalclad steel ceiling panels. Fannon Products Div., Hupp Corp.

(71) FOOT SWITCHES. Bulletin GEA-7086A, 4-page revision, includes latest information about complete line of heavy cast-iron foot switches. General Electric Co.

(72) MERCURY-VAPOR LAMPS. "Why Lifeguard Mercury Lamps?" contains information about life and maintenance, lamp construction and a chart on lumen output. Westinghouse Electric Corp., Lamp Div.

(73) CONTACTORS AND STARTERS. Bulletin GEA-7326, 8 pages, describes NEMA Sizes 3 and 4 magnetic contactors and starters added to 100-line of motor controls. General Electric Co.

(74) BATTERY CHARGERS. Bulletin 6202.1 describes performance features and construction details of expanded line of lead-acid battery chargers. Lincoln Electric Co.

(75) CONDUIT. "Color-coded" Sherarduct conduit with MVC-1 coating is described in 4-page Bulletin No. 713. H. K. Porter Co., Inc., National Electric Div.

(76) LIMIT SWITCHES. Publication GEA-7312.1, 2-page supplement to Limit Switch Bulletin GEA-7312, includes information on new CR-9440 extended arm J1 and K1 limit switches. General Electric Co.



#### NO BOLTS, NO SCREWS, NO DRILLING

with **NEW** Permacel Junction Box Mount epoxy adhesive . . . the fast, easy way to attach junction boxes to any surface.

Guaranteed for a period of one year from date of purchase not to harden in the cup until mixed or until divider section is removed.

PERMACEL

NEW BRUNSWICK, NEW JERSEY . TAPES . ELECTRICAL INSULATING MATERIALS . ADHESIVES

### Pipe or Conduit Hangers

Most complete line with addition of 2 new sizes to oldest established standards in the industry.



The saddle or pipe support can be turned 360°, permitting pipe to run parallel or at right angle.

Excellent for confined areas—No drilling —no use of straps.

Made of highest grade malleable iron, with case hardened set screw—all cadmium plated. For Aluminum, write for details.

For hanging  $\frac{1}{2}$ " thru  $\frac{2}{2}$ " pipe or conduit to steel beams  $\frac{3}{8}$ " thick.





Short Stem
TELEPHONE
and
DUPLEX
NOZZLES

These modern, flanged, short stem duplex telephone and receptacle nozzles can be used with all types of "Latrobe" boxes and come in satin brushed brass or anodized aluminum. Standards fit ½" opening. 34" stems are available, also grounded type receptacles.







BRASS and ALUMINUM

Sales Representatives in all principal Cities

Sold only thru wholesalers

MANUFACTURING COMPANY 1209-1215 JEFFERSON ST. LATROBE, PENNSYLVANIA

- (77) POWER SUPPLIES. Bulletin CV-235-A covers constant voltage dc power supplies. Sola Electric Co.
- (78) PANEL METERS. Bulletin GEZ-3352 describes new rectifiertype ammeters and voltmeters. General Electric Co.
- (79) LIGHTING. 4-page lighting report entitled "Indoor Sports Lighting for Educational Institutions" includes 12 photographs showing both mercury-vapor and incandescent fixtures in indoor gymnasium applications. Holophane Co., Inc.
- (80) Magnetic Drives. Bulletin 3650 describes magnetic adjustable speed drives available in ratings from 50 through 2500 hp. Louis Allis Co.
- (81) FLOODLIGHTS. Bulletin GF860 describes new multi-purpose floodlight "Generalflood" added to their line of new Intenso floodlights. Appleton Electric Co.
- (82) TERMINALS. New catalog enables user to select proper terminal or splice by computing circular mil area of wire, AMP Inc.
- (83) HEAT CONTROL catalog gives detailed description and illustrations of complete line of thermostats for the control of electric heating. Mears Controls Inc.
- (84) PHOTOELECTRIC CONTROL. Bulletin GEA-7230 describes new simplified photoelectric control designed for any lighting application where extended time delay is not desired. General Electric Co.
- (85) Magnet Wire. Technical brochure covers Class B cement coated epoxy magnet wire. Anaconda Wire and Cable Co.
- (86) PORTABLE ELECTRICAL TESTERS. New 8-page catalog lists a full line of portable units, with complete data on models, accuracies, ranges, features and prices. Daystrom, Inc., Weston Instruments Div.
- (87) Motors, Bulletin 107 features complete line of Shell-Type motors available in open, enclosed or liquid-cooled ratings ranging from ½ to 150 hp. Louis Allis Co.
- (88) Motors. 6-page Bulletin L-3313A describes full line of ac general purpose 56-frame motors for driving such machines as compressors, pumps, high inertia fans and blowers, refrigerators, air conditioners and machine tools. Kingston-Conley, Inc.

- (89) LIGHTING. Seven bulletins, presented in tabular form, describe and illustrate line of commercial incandescent lighting in new 1961 lighting catalog. Art Metal Lighting Div., Wakefield Corp.
- (90) INSULATION. Gold Bond Mineral Wool Insulation Consumer Booklet 2149 simplifies insulation selection and shows homeowners "where" and "how" to insulate. National Gypsum Co.
- (91) RADIANT HEAT. Electric infrared radiant heat is explained in 4-page brochure containing application illustration—both indoors and out. Fostoria Corp.
- (92) SOLDERING. Catalog 111 contains a complete listing of industrial electric soldering irons—a total of 80 models in seven distinct types; 20 to 700 watts; ½-in. to 12-in. tips. Hexacon Electric Co.
- (93) LIGHTING. 4-page brochure describes the features of the new Park Square line of incandescent lighting fixtures and illustrates how the basic housings can be used to accept any one of several combinations of new face frames and shieldings. Litecraft Mfg. Corp.
- (94) CONDUCTORS. Core wires, cable reels and conductor lengths are described in new revision of "Aluminum Electrical Conductors, Stranded-Bare." Rome Cable Div., Aluminum Co. of America.
- (95) ELECTRIC HEATING. New 1961 catalog details complete line of portable heaters including new portable automatic baseboard Heetaires. Markel Electric Products, Inc. and LaSalle Products, Inc.
- (96) INSULATION. Plastic wall chart simplifies the choice of proper insulation to meet the new "R" factor standards, shows the unique color-coding system which identifies Gold Bond mineral wool insulation thicknesses, and specifies the Gold Bond products which best meet the "R" factor requirements of the new standards. National Gypsum Co.
- (97) Boring Tool. 4-page Bulletin 359 describes Extend-A-Bit drill for boring holes through successive joists or studs in new or finished ceilings and walls. Ability Electric & Mfg. Co.
- (98) HIGHWAY SIGN LIGHTING. Booklet B-8253, 8 pages, shows how to use fluorescent equipment to light any type of highway sign. Westinghouse Electric Corp., Lighting Div.



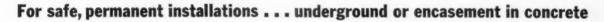
- \* Hot-dip galvanized rigid steel conduit
- **★ Electrical metallic tubing**
- \* Rigid aluminum conduit

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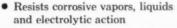
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knockouts



ALL-STEEL EQUIPMENT INC., Aurora, Illinois















### Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installations, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay \$5.00.

#### T-Connected Transformers

QUESTION X39—The consensus of opinion at our plant is that economics dictate in the design of Tconnected transformers for 3-phase to 3-phase power in capacities of 15 kva and less.

I would appreciate a discussion on the subject of economics of design for 3-phase transformation on T-connected vs. 3-phase transformers.—J.A.M.

ANSWER TO X39—With the advent of the 480Y/277-volt system for large commercial and industrial buildings, 3-phase, T-to-T connections have been widely used to provide reduced voltages for small blocks of power up to 15 kva. As you state, economics is the main consideration for selecting the T-connected transformers in the smaller ratings.

The T-T connection requires only two single-phase transformers. One of the units is called the main transformer, which has a 50% voltage tap to which the teaser transformer is connected. With the T-T connection, the bank capacity is the same as for two transformers connected open delta (57.7% of the normal 3-phase bank capacity). However, T-connected transformers have a somewhat higher efficiency than open-delta-connected transformers because the teaser transformer, if identical units are used, operates at reduced flux density; and therefore will have lower iron loss.

When considering large numbers of small 3-phase units (3 kva through 15 kva) for a given installation, substantial savings will be effected by selecting T-connected units over other types where voltages are 600 or less. And finally, economics is an important factor in sound engineering practices; so why pay more for 3-phase units that contain an extra transformer when the performance and service of the T-connected units have proven to be entirely satisfactory in the ratings previously stated.—J.H.W.

ANSWER TO X39—You have observed the situation correctly in the first sentence of your question. The simple truth is that T-connected

transformers, in ratings up to 15 kva, 600 volts and below, are the least expensive units for reducing primary voltages of 480 or 600 to 208Y/120. I might add that the use of T-connected transformer units in the stated ratings has been considered a standard practice for the last few years.—O.A.K.

#### Circuit-Breaker IC Ratings

QUESTION Y39-We have a 100amp, 3-phase, 208/120-volt lighting panel with a 50-amp, 3-pole, "EH" frame, main breaker and nine 20amp, 1-pole, "EQ-B" frame branch circuit breakers. All branch-circuit wire is No. 12 TW. The current available with a short circuit at the panel is 14,000 amps asymmetrical; a fault on a branch circuit 5 ft or more from the panel would have 5.000 amps or less available. Should "EH" frame breakers have been used for the branch circuits to protect against a fault in the first 5 ft. or will the main breaker handle this? -A.G.C.

ANSWER TO Y39—To place this discussion in the proper perspective, we must first realize that the interrupting-capacity ratings for fuses and circuit breakers must be based on the short-circuit current available at the point of application—not 5 ft away—but at the closest possible point that a fault could occur. All manufacturers of protective devices advise this, and it is an important factor in sound engineering practices.

The only time an overcurrent device can be installed at a point in a distribution system exceeding its IC rating is when it is "backed up" by devices having appropriate current-limiting features and coordinated ratings. And where this procedure is contemplated for circuit breakers, one should consult the circuit-breaker manufacturer as to the minimum and maximum ratings of CL fuses recommended for "backup" protection.

In the installation you have described, you are attempting to place circuit breakers of a smaller IC rating in series with a main breaker

with a higher IC rating, expecting that the main breaker will protect the smaller breakers in the event a short circuit occurs, which exceeds the IC rating of the smaller CBs. It will not work because the 50-amp CB does not have current-limiting features that would limit the shortcircuit current to a magnitude low enough to protect the 20-amp CBs. Type EQ-B breakers have an interrupting rating (NEMA) of 5,000 asymmetrical rms amps. And taking the data from one manufacturer, the interrupting rating for the EH frame CB is 20,000 asymmetrical rms amps when applied at 240 volts. Another manufacturer rates his EH frame breakers at 10,000 asymmetrical rms amps, so let's hope that your particular EH frame CB will handle the 14,000amp short circuit you have computed. Assuming that it will, the EH frame breaker should have been used for the 20-amp branch circuits, as it is apparent from your description that a short at the point of application of the 20-amp CBs will exceed 5000 amps (the maximum interrupting rating of the EQ-B breaker). The only other alternate would be the use of the coordinated CL fuses ahead of the 50-amp EH breaker of a size to protect the 20amp EQ-B breakers. However, consult the CB manufacturer first.

The discussion up to now has related only to the aspects of minimum safety. In the future, why not consider the selective coordination plan, which takes into consideration sound engineering as well as safety. This plan of overcurrent protection provides for clearing faults by the device next back from the fault. For example, a fault on a branch circuit will be cleared by the branch-circuit overcurrent device; and the subfeeder, feeder and main overcurrent devices in series with the branchcircuit device back toward the service entrance will not operate. On a subfeeder fault, only the faulted part of the system will be taken out of service-which minimizes the extent of the outage. On the other hand, a branch-circuit fault, which opens the protective device for the subfeeder or feeder supplying the branch-circuit devices, causes loss of power to all branch circuits connected to the subfeeder or feeder.

### Sell the electrical system General Electric

New sales features help you



Women "light up" when they see this G-E Master Selector Switch. It lets them dial 12 lights On or Off all over the house . . . from the bedroom. They know it will save

them steps, every day of the year — and help them feel safer, late at night, too. Attractive pilot-lighted directory shows exactly which lights are ON.



Multi-point control costs less with G-E low-voltage switches and wiring. Put switches at every doorway.



Conveniences such as extra control points for outside lights — are more practical and economical to offer.



There's powerful "magic" in G-E master switches. They light up whole property at touch of a finger!



Added safety important — Switches carry just 24 volts — relays separate them from 120-volt circuits.

### that helps sell homes. **Remote-Control Wiring**

get profitable new business



New switches, new book, new movie . . . to help you . . . Handsome new Switches, new book, new movie... to help you... Handsome new G-E Remote-Control Wall Switches come in standard pushbutton, locking and trigger styles — each in non-lighted, locator-lighted and pilot-lighted types. New "plug-in" relay centers give you quiet, simplified installations.

A new Technician's Manual and movie help show you how to install this modern, low-voltage system. You learn simple techniques that will now off for years!

techniques that will pay off for years!

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GENERAL 88

Looking for a new idea that will set you apart from your competition?

Install the newest in electrical systems - G-E Remote-Control Wiring. It offers extra eye appeal, convenience, comfort and safety that other systems can't match.

Builders like G-E Remote Control because it is a low-cost, house-selling feature - easy to demonstrate effective in persuading customers to

They like the extra 3-way and 4-way switching they can offer - the dramatic master switching - at surprisingly economical cost.

Get the jump on competition. Offer the latest and best wiring in your community — G-E Remote-Control Wiring. It bears the name your customers recognize as the leader!



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NAME COMPANY ADDRESS STATE

I would also like to see your new Remote-Control Wiring movie, "Pathways of Living" when shown in my area.





Astro-Dial Control Bulletin 6022





short-circuit duty at its point of application. The coordination is achieved by studying the overloadcurrent curve vs the time required for operation of each device. Following this, selection of devices is made so that the device nearest the load will operate faster than all the devices behind it: and each of the other devices in sequence back to the service entrance will operate faster than any of the devices behind it. The main overcurrent device (the one farthest from the load) must have the longest time delay on branch-circuit faults .-J.K.L.

Each protective device in the selective coordination plan is rated for



Outdoor Contro Bulletin 6119





15-Minute Contro



PUZZLED about time controls?

PAYS to know these PARAGON automatic time controls...they solve most any problem

How many of these precision-built Paragon Time Controls do you know? These are only a few of a complete line offered by Paragon . . . hundreds of models are available for practically every application in farm, home and industry. Today, Paragon is recognized throughout the world as a leader in the time control field, because all of its engineering and manufacturing skill is devoted exclusively to one product—TIME CONTROLS.

It will pay you to know more about Paragon. For more information on Paragon's complete line...location of its 88 Service Centers...contact your authorized Paragon Distributor. He carries a full line in stock, and is highly qualified to offer technical assistance on any application. There is no obligation.



#### PARAGON ELECTRIC CO., INC.

Subsidiary of American Machine & Foundry Company 1614 TWELFTH STREET • TWO RIVERS, WISCONSIN



Automatic Reset Control Bulletin 6002





Cycle Repeater Contro Bulletin 6008







#### Synchronous Motor

QUESTION Z39—I have, in several cases, tried to pick up wattless current with 1.0 pf synchronous motors by increasing the dc excitation. It just doesn't work. Why?

I have done this with 80% pf machines (motors and generators) and it does work.

Why, if we have an 80% full load on a 1.0 pf motor, will it not carry the balance of its capacity in kvar the same as one rated at 80% pf will do when carrying 100% of its rated hp or kw load?

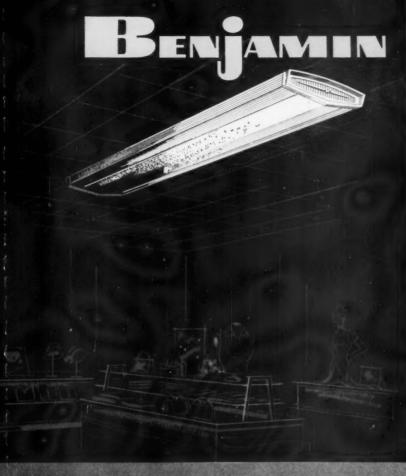
I have tried this on 1.0 pf motors working at only 20% to 30% of their rating; even then I was unable to get an increase in motor amps with an increase in field excitation,—A.A.N.

ANSWER TO Z39—A 1.0 pf synchronous motor is designed to take only energy current from the ac supply line when operating at full load. This improves the power factor of the system, because no excitation or wattless current is taken along with the energy current. Slow speed 1.0 pf synchronous motors are usually not built for excess excitation

The 0.8 pf leading-type synchronous motor is designed to carry its rated load when it is drawing loading excitation current from the ac supply line. In this condition it will supply a certain amount of magnetizing current to induction motors.

Assuming that the wattless current, which you desire to pick up, is lagging current, it appears that the 1.0 pf machine is not built for operation with sufficient excess field current to result in leading power factor.

Your attempt to equate the kvar capacity of a 1.0 pf machine at 80%



# DISCRIMINATING DIMENSIONS IN LIGHTING

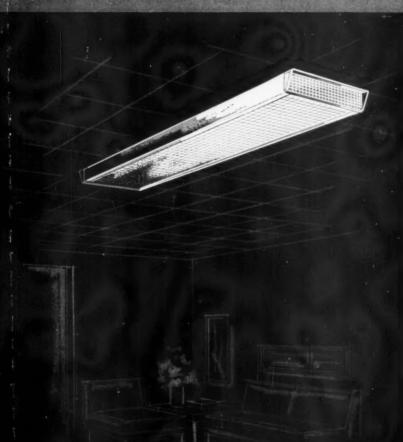
We're proud to offer two of the most distinguished designs available in the market today. Benjamin know-how has combined superior engineering and maximum lighting efficiency in smart, slim fluorescent fixtures, that add the note of distinction to any office or commercial installation. Dramatically decorative . . . competently functional.

No visible metal supports. Can be mounted singly or in continuous unbroken line. Variety of light-diffusing lenses for any purpose. Two or four lamp. Forty-eight inch lengths.



#### The incomparable CORONADO

Here is the latest development in controlled lighting—3 in 1 lens—snap-in wiring channel—only 21/6" deep—two types of lens. Designed for surface mounting for all types of commercial lighting—offices, schools, banks and other interiors that require high quality illumination, realistically priced.





The distinctive

... Catalina

Today's most copied commercial fixture. Its beauty of design and universal adaptability make it the number one choice of architects and consulting engineers. Selected by contractors for its ease of installation. In either prismatic lens or plastic louvers, this unit has no equal.



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The World's Largest Single Source of Lighting for Home, Commerce and Industry

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#### THOMAS INDUSTRIES INC.

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Please have your Lighting Specialist call

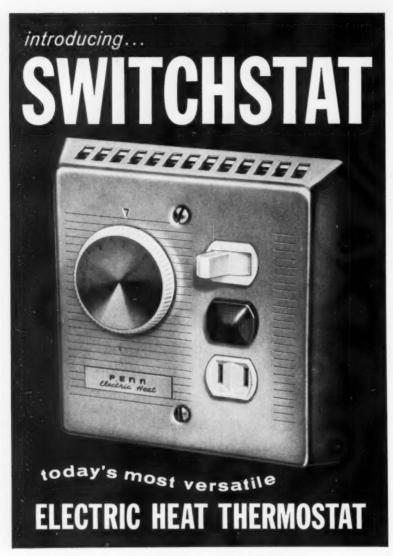
Please send me your new folders on the Catalina and Coronado

Firm.\_\_\_

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Zone Stat



#### combines temperature control with interchangeable wiring devices!

For bathrooms, kitchens, recreation rooms, and any place you need a room thermostat combined in one mounting with interchangeable switches or other devices . . . use the all-new Penn Switchstat.

Simple to install and easy to wire, Switchstat is beautifully designed to harmonize with any room decor. It offers more convenience than any other electric heat thermostat. You can easily install one, two or three wall switches . . . pilot light . . . convenience outlet . . . or any other combination of interchangeable wiring devices all in one attractive unit. Try it on your next job, you'll discover Switchstat's many advantages. Ask your wholesaler or write to Penn.

#### PENN CONTROLS. INC. Goshen, Indiana

AUTOMATIC CONTROLS FOR HEATING, REFRIGERATION, AIR CONDITIONING, APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

load with the kvar capacity of an 0.8 pf machine at 100% load is in error. Design of either machine would govern its kvar capacity. However, the 0.8 pf machine would take care of an amount of wattless current equal to its exciting current and of opposite phase relation.

In any power-factor-correction problem, which is to be solved by use of a synchronous motor, a study of the conditions is imperative. From data, the correct size and pf motor can be selected or designed. -G.M.O.

ANSWER TO Z39-A synchronous motor operating at unity power factor draws no reactive current from the line. On the other hand, it does not furnish any leading reactive current to compensate for the magnetizing current drawn by a large number of induction motors in a plant.

When a synchronous motor operates at leading power factor it means that not only does it draw no magnetizing current from the power system, but supplies magnetizing current for all or part of the induction motor load-according to the size and design of the synchronous machine.

You seem to believe that a synchronous motor will supply several times as much corrective effect at part load as it will at full load. However, this is not so. Take a 200-hp, unity-power-factor motor that operates at 50% load. At this load the efficiency will be about 92%. This would give us an input of about 108 hp or 81 kw. By plotting a curve it can be seen that the motor will operate at 92% leading power factor with a 50% load. Further calculations would result in a figure of approximately 34 rkva, which isn't a great deal of correction. In fact, it's about the same as you would get from a 60-hp, 80% pf motor running at full load.

As to your unity pf motor operating at 80% load, you may be surprised to learn that this will only result in a leading power factor of

The above information, together with formulas and tables, can be verified by referring to a book titled "Power Factor In Your Plant," by W. C. King, and available through the Cornell-Dubilier Electric Corp., South Plainfield, N. J. This book also describes the many ramifications involved in selecting the proper power-factor corrective equipment. Moreover, it gives the advantages and disadvantages of synchronous machines .- J.C.H.

# WIREMOLD ELECTRIC IDEAS

PREPARED EACH MONTH FOR ELECTRICAL CONSTRUCTION AND MAINTENANCE TO BRING IDEAS, NEWS AND HELPFUL INFORMATION TO ELECTRICAL MEN

#### 62nd YEAR

#### SEPTEMBER 1961

STRIP OUTLETS MEET DEMAND	FIRST PAGE
CODE COMMENTS	FIRST PAGE
EDITORIAL SE	COND PAGE
PRODUCT OF THE MONTH SE	COND PAGE

QUIZ CORNER	THIRD PAGE
PERSONNEL NOTES	THIRD PAGE
MEETINGS AHEAD	THIRD PAGE
COUPON FOR FREE ITEMS	THIRD PAGE

ENGINEERED SPECIALS	 FOURTH	PAGE
GROUND TO GROUND	FOURTH	PAGE
PRACTICAL TIPS	 FOURTH	PAGE

#### Strip Outlets Meet Buyer Demand For Convenience

Safety, adequacy not enough; home buyers want convenience in electrical wiring

Electrical wiring, to the user, is but the means to the end—a method of making electrical power available. Today, he assumes home wiring will be safe and adequate. What he seeks is convenience.

Convenience, in user terms, means plenty of outlets located so as to avoid use of dangerous extension cords or cube taps.

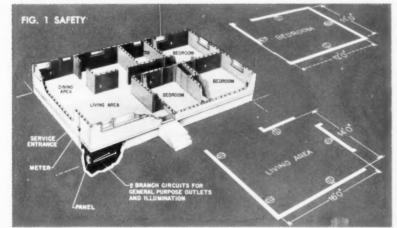
How do you combine safety and adequacy with this kind of convenience? The logical answer is multioutlet assemblies.

Of two standard references for electrical wiring, the National Electrical Code provides safety only, while the National Wiring Bureau's "Residential Wiring Handbook" affords safety and adequacy. Both fail to include convenience.

Following NEC requirements, on the basis of 3 watts per square foot, a residence with an area of 1,260 sq. ft. is provided with two branch circuits which serve general illumination and all receptacles except those for appliances.

Again, outlet spacing is determined on the basis of one receptacle for every 12 linear feet or major fraction thereof. Thus, a living room with a total of 60 linear feet is given five receptacles and an 11 x 12 bedroom is wired with four (fig. 1).

continued on next page



SAFETY is obtained when the recommendations of the National Electrical Code are followed. By its own definition, the

Code does not pretend to provide adequacy or convenience. All three are furnished when multi-outlet systems are used.

#### **Code Comments**

#### Permissible Load

- **Q.** What is the permissible load for a branch circuit having two or more outlets?
- A. Section 210-24 of Article 210 reads, "(a) 15- and 20-Ampere Branch Circuits. Lighting units and/or appliances. The rating of any one portable appliance shall not exceed 80 per cent of the branch circuit rating. The total rating of fixed appliances shall not exceed 50 per cent of the branch circuit rating when lighting units or portable appliances are also supplied. (b) 30-Ampere Branch Circuits, Fixed lighting units with heavy duty lampholders in other than dwelling occupancies; or appliances in any occupancy. The rating of any one portable appliance shall not exceed 24 amperes."

#### Low-Voltage Wiring

- **Q.** What is the maximum number of twisted cables allowed in Wiremold 2100 for low-voltage wiring?
- A. Articles 725 and 800 of the Code deal with remote control, low-energy power, low-voltage power and signal circuits, and communications circuits respectively. The limitations concerning the number of conductors to be used with the various Wiremold series are covered in the first sentence of Article 300, Section 300-17.



#### **Editorial**

How home buyers rate wiring

A survey conducted for HI-PO (Housing Industry Promotion Operation) reveals that home buyers rank "enough electrical power and wiring" as the third major consideration in home buying. This confirms what many of us in the electrical end of the business have been saying for some time.

Now that the builders themselves have been told this, it is up to us to convince them that adequate wiring is a necessity — and that convenient wiring is a merchandising plus.

Multi-outlet systems have long been the hallmark of quality homes. The contractor who is proud of his work and thinks in terms of user acceptance will find that these surface systems offer an opportunity to sell-up a routine wiring job into a quality installation.

#### **Product of the Month**

More effective Pancake installation with redesigned fittings

Two groups of fittings for Pancake<sup>®</sup> 1500 have been redesigned to include these features: cover fastened to the base for a stronger installation; combination No. 1500 and 2600 twistouts on four sides to provide greater versatility; and a new contour design for a neater overfloor installation.

Fittings in the redesigned groups are the 1543L Duplex Receptacle, the 1543AL Polarized Duplex Receptacle-3 wire; 1543GL Grounding Duplex Receptacle. Also, 1546A Single Receptacle Box; 1546B Duplex Receptacle Box; and the 1546T Telephone Outlet.







1546B

1543AL

1546T

#### Strip Outlets Meet Buyer Demand continued from preceding page

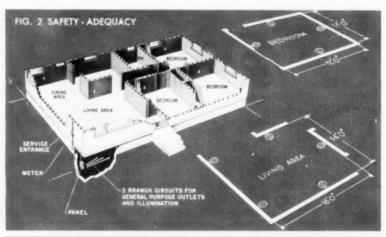
By following the recommendations of the Residential Wiring Handbook, our 1,260 sq. ft. house is provided with three 15-amp. general purpose circuits compared with the previous two. This, then, begins to assure adequacy. How about convenience?

In general, the Handbook requires that outlets be placed so that no point along the floor line is more than 6 feet from an outlet in that space. In other words, an outlet for every 12 linear feet, the same as the Code (fig. 2).

Convenience can be a companion to safety and adequacy. Multi-outlet systems combine all three into neat, unobtrusive wiring.

Figure 3 shows the same house wired with Plugmold.® Five branch circuits service convenience outlets. The living room now has 16 outlets; the bedroom, 14.

Plugmold systems not only assure a satisfied customer, they give builders a selling advantage and the engineer and contractor the knowledge that they have furnished the ultimate in wiring — a safe, adequate and convenient system.







#### **Quiz Corner**

Questions for this department are taken from inquiries received from the field. Your questions are welcome; indeed, they are necessary if this department is to serve you with worthwhile information. Address:

> Quiz Corner The Wiremold Company Hartford 10, Conn.

How would I mount a 30amp. receptacle in 3000 Wiremold?

 Use 3046L Fustat Device Cover on a 5751 Flush Type Extension Adapter or any box with an extension base.



What is the difference between maximum permitted and recommended normal wiring tables?

 Recommended normal wire capacity is the capacity of the onepiece raceways when the installation involves bends and elbows. The number of Conductors under "Maximum Permitted Capacity" may be run in these raceways but they are recommended only for straight runs with no bends or elbows. See Page 9. Catalog 22.

O. Can I feed 2000 Plugmold from the side with conduit?

Yes. Use a 2010A Entrance End Fitting and a 2015 Tee.

· When using 1000 Wiremold what box is available for mounting 2 or 3-gang devices?

• The 1048 Switch and Receptacle Box is available in larger than 1-gang on special order.

Does Wiremold make a mounting strap for Plugmold 2000?

No. A mounting strap is not needed. Plugmold base is mounted directly to the surface through the piercings which are provided every  $7\frac{1}{2}$  inches.

· Can I get into 2200 Plugmold from 1" pipe?

A Yes. Use 2210D Entrance End Fitting.

How do I get out of a flush wall box into 3000 Wiremold?

A Use 3014C Wall Box Connector.

Wiremold flexible sections 200F, 5700F, and 1000F are furnished in 18-inch lengths. Are other lengths available?

· Yes, on special order.

#### **Personnel Notes**

Wynne Snoots, Dallas, and Russ McKnight, Oklahoma City, represent Wiremold at Oklahoma City's IAEI meeting.

Tom Pugh, Baltimore, Dick French, Philadelphia, and Henning Thomsen, Home Office, will be on hand at Philadelphia's Convention Hall.

Tom and Dick then join Frank D'Esopo, Home Office, and Phil McGovern, New York, at the Warwick Hotel in the City of Brotherly Love.

Show dates and locations are listed under "Meetings Ahead."















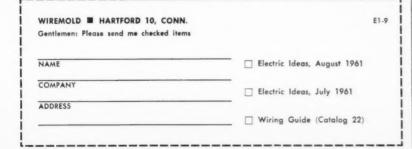
Phil McGovern

#### **Meetings Ahead**

Western Section, IAEI - Biltmore Hotel, Oklahoma City, Okla., Sept. 25-27.

Electrical Progress Show - Convention Hall, Philadelphia, Pa., Oct.

Eastern Section, IAEI - Warwick Hotel, Philadelphia, Pa., Oct. 9-11.



WIREMOLD

#### **Engineered Specials**

Twisted elbows developed for Wiremold 2100 and 3000

#### PROBLEM:

To provide a method of making a 90° twist with a 90° turn with Wire-mold 2100 and 3000 series

#### SOLUTION:

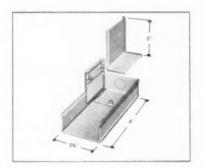
Use of specially-developed twisted elbows permits making a double right-angle turn, right or left hand, from one surface to another.

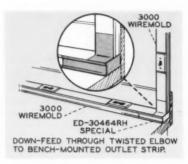
#### DISCUSSION:

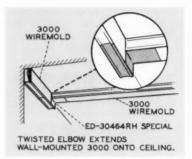
Two internal twisted elbows have been developed to permit making 90° turn-and-twist combinations from one surface to another.

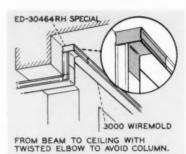
Both the ED-30600 Special, for Wiremold 2100, and the ED-30464 Special, for Wiremold 3000, are available on special order in right hand (RH) or left hand (LH) configurations. Elbow is furnished with right-angle cover section.

Wiremold engineers continually seek the development of products to solve in-field problems.









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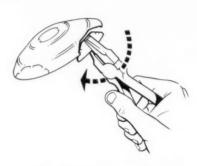
#### **Practical Tips**

Care key to simple, neat twistout removal

Care and proper methods assure twistout removal without distorting the metal.

For sheet metal parts, (1) locate the retention tabs and use them as a hinge or pivot point. (2) Hold the fitting in one hand while firmly gripping the TO with side cutters in the other hand. (3) Rock back and forth on pivot point until tab breaks off. (4) In multi-TO patterns, exercise care so that only one twistout at a time is removed.

In die-cast parts, (1) hold fitting in one hand while firmly gripping TO with side cutters in other hand. (2) Make certain nose of side cutters is in center of twistout and in as far as the edge of the TO outline.
(3) A quick motion of cutters and fitting around the pivot point will break out the TO cleanly and neatly.





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QUESTION H40-A portable filter for a swimming pool has a 1/3-hp motor, single phase, 110 volts, and is plugged into an outdoor receptacle. The equipment - motor, pump, tank, etc.—is mounted on a steel carriage with rubber tires and is grounded through the cable and grounding-type plug and recepta-

Somebody, who once got an unforgettable electric shock from an outdoor portable electric appliance. classified this arrangement as extremely dangerous. The ground around the filter is mostly soaking wet, due to splashing from the pool and leakage on the filter; and children of all ages are running around

Is the above installation foolproof, or are additional safety measures required or recom-mended?—J. A.

QUESTION J40-I have run into a controversy on the use of explosion-proof pushbuttons with ground flanges and bolted covers out of doors. Some people maintain the ground flange surfaces are not suitable for use in the rain, and others maintain they are. I have used this type successfully out-of-doors with no water getting in the enclosure, but I have always kept the flanged surfaces clean and greased. Will someone who has had experience with this type of equipment please give me their viewpoint,-W.E.G.

QUESTION K40—We are planning on pulling three single-conductor, neoprene-jacketed 500 MCM 13.2ky cables through a 100-ft run of 4-in, steel conduit that connects a manhole to a building. This conduit has been empty for 20 years and is coated with rust, and there is evidence that debris and mud have been deposited in it by the water that is normally in the manhole. Can someone suggest a method for cleaning out the pipe effectively and also a type of pulling compound to facilitate the pull? -R.E.B.

PLEASE SEND IN YOUR ANSWERS BY OCTOBER 15



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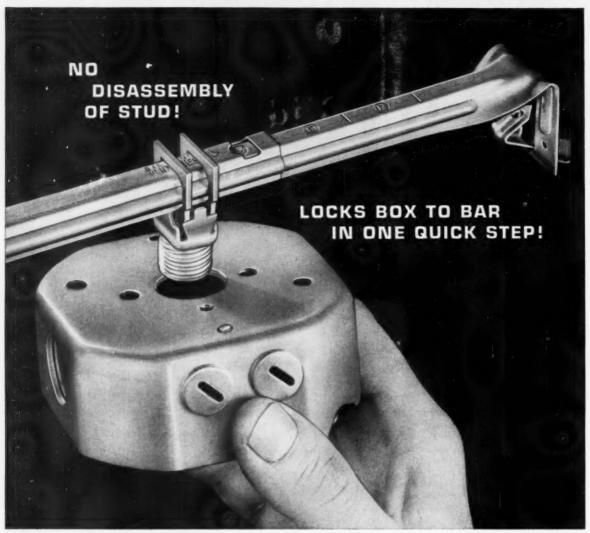


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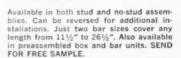
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#### **Questions on the Code**

Answered by:

B. Z. SEGALL. Consulting Electrical Engineer, New Orleans, La.

R. E. WARD, Chief Electrical Inspector, Insurance Department, State of Tennessee, Nashville, Tenn.

#### Meter-Socket Installations

Below is a sketch of a serviceentrance conduit run and a gang of 3-opening meter sockets connected together with pipe nip-

NEC Section 373-8 prohibits such method in case of a group of switches, but in a case of a group of meter sockets, we are not sure.

Please let us have your opinion

on this matter.

1. Does Section 230-42, Exception No. 1, which permits "clamped or bolted connections in a meter enclosure," mean that a gang of meter sockets with third opening connected together with pipe nipples be permitted?

2. If the answer is no, then is there any other part in the code where this method of multiple metering is permitted as a service

equipment?

3. Does the code prohibit the use of fittings on the service entrance conduit run such as the Type "LB" fitting shown in the sketch?-Y.N.

 $\phi N \phi$ Service entrance 3 (three) opening meter sockets without wire trough Type LB condulet

Method sometimes used where 3 rates prevail in an Electric Utility Co., or where multiple occupancy in an apartment

For the convenience of our readers the provisions of Section 373-8 are quoted as follows:

"Switch Enclosures. Switch enclosures shall not be used as junction boxes, troughs or raceways for conductors feeding through or tapping off to other switches, unless designs suitable for the purpose are employed to provide adequate space for this purpose."

This rule, which first appeared in the 1946 Code, reduces the hazard which results when conductors are crammed in switch enclosures where the movable parts of switch mechanisms chafe the insulation and cause it to fail. Enclosures for standard knife switches are designed only to accommodate the conductors incident to the function of a switch. As a result, conductors foreign to the duty of a switch are not permitted unless the above quoted rule is satisfied. While a meter socket with its meter may be classified as a switch. I doubt that such a combination was considered when the rule was formulated. According to Webster a switch is "a device to break an electric current or transfer it to another conductor." According to the NEC, a switch is not defined. The code definitions speak only in terms of use, form and rating. While a meter socket and its meter perform the function of a switch. I am inclined to believe that the provisions of Section 373-8 do not apply. To me, such an interpretation would be an abnormal distortion of the rule.

In support of this opinion, Underwriters Laboratories, Inc. list, under their label service, meter sockets with the following quote:

"Meter sockets consist of assemblies of enclosure, wiring terminals and contact jaws for plug-in types of watthour and similar meters, and provide for fastening of the meter to the socket. Meter sockets do not include overcurrent devices, normally arcing parts or the like; they may include provision for current transformers but not the transformers.

"Devices listed as meter sockets may accommodate from one to 12 meters.

"Ratings of listed meter sockets are limited to 600 volts ac maximum and to 200 amps maximum through any meter. Meter sockets accommodating two or more meters also have an over-all ampere rating. Meter sockets having provision for current transformers also include the maximum transfer current rating.

"Meter sockets listed herein are for use with copper conductors unless marked to indicate which terminals are suitable for use with aluminum conductors. Such marking shall be independent of any marking on terminal connectors and shall be on a wiring diagram or other readily visible location.

"Wire connectors in listed meter sockets are intended to accommodate one conductor only unless use with more than one conductor is clearly indicated on the wiring diagram or other readily visible

locations."

It is significant to note that no reference is made to the characteristics of a switch. When a meter socket is provided with three hubs as shown on your diagram, and is listed by UL, there is no occasion to question the provisions of Section 373-8. On pages 28 and 29 of the September 1960 issue of EC&M, the Square D Company illustrates meter sockets accommodating nine meters. This unit assembly, approved by UL, appears to be a proper solution to the meter socket problem. This comment does not infer that the installation illustrated by you is in violation of code

The provisions of Section 230-42. Exception No. 1, are intended to cover the situation which prevails when the meter is located on the line side of the service switch. Under such circumstances, splices or bolted connections are necessary to connect the socket to the serviceentrance conductors. In my opinion, it covers the application shown on your diagram. It is important to note, however, that the UL advice, quoted above, which directs our attention to the number of conductors connected to a terminal. must be satisfied.

The provisions of Section 230-52 are general in nature, and require all types of rigid metal raceways, used for services and exposed to the weather, to be made raintight. In order to satisfy this code provision, an "LB service-entrance el-bow" has been developed. One design is provided with a gasket and blank sheet-steel cover having end wedge nuts. The other has a blank cast cover having break-neck locking screws,—B.A.McD.—9/61/1

#### JOB-PROFIT TOOLING IDEAS

FROM GREENLEE



"We saved several thousand dollars with GREENLEE TOOLS on a complicated missile site contract,"

> says FRED S. BREECE superintendent of electrical construction for A. NERI, Inc., of California

A. Neri, Inc., of California, is the electrical contractor for three Titan missile-launching complexes near Mountain Home, Idaho. Specifications for this job call for approximately 345,000 feet of rigid conduit and over 90,000 feet of thin-wall conduit. Installation requires more than 14,000 bends and 2,000 knockout openings for distribution and junction boxes.

Ralph Neri, assistant superintendent on the job, reports, "We are using Greenlee benders, knockout punches, and punch drivers exclusively. In most cases we have been able to take the tools right to the conduit instead of taking the conduit to the tools . . . and get the job done faster."

This view (right) of one of the missilelaunching sites gives some idea of the complexity of this job. The cylindrical structure still in the forms is the entrance portal for the entire complex. The concrete dome will house the control center. When the work is completed, all these structures will be completely underground.





Work area in the tunnels and other structures in the missile-launching complex is so limited that A. Neri, Inc., set up a prefabricating shop where bends in various diameter conduit are made on Greenlee benders. The finished bends are then taken to the construction site for installation, substantially reducing the man-hours required to complete the job. Two No. 884-E one-shot benders with 4" capacity, and powered by Greenlee No. 798AC-SA two-speed hydraulic power pumps, are used in this prefab shop.



Bending conduit right on the job is done on three Greenlee No. 880-M2 benders like the one shown above. Breece reports the light weight and compactness of these tools are a definite advantage to job efficiency in the confined work areas of the tunnels. All benders are operated either by Greenlee hydraulic hand or power pumps. According to Breece, there have been no major repair or maintenance costs with any of their Greenlee tools—another big saving for A, Neri, Inc.



To complete this job, workmen for A. Neri, Inc., will make over 4,000 bends in 90,000 feet of ½" through 2" thin-wall conduit, using three Greenlee No. 880-M2T thin-wall benders (as pictured above).

For total bending work on both thinwall and rigid conduit on this contract, Breece estimates his company will save several thousand dollars through the use of Greenlee benders.



"We also should save by using Greenlee knockout punches and drivers," Breece states. To speed the work of making over 2,000 knockout openings for ½" through 4" diameter conduit, A. Neri, Inc., is using Greenlee No. 7310 hydraulic knockout driver and punch sets (as shown above), Greenlee No. 1731 one-shot knockout punch driver, and the No. 1804 ratchet knockout driver.

Greenlee equipment used for this contract was purchased from National Electric Supply Company, Oakland, California, whose representative worked closely with A. Neri, Inc., in providing the right tools for each job. For help in selecting the exact GREENLEE JOB-PROFIT TOOLING needed to streamline your operations, help control costs, and assure a better return on your tool investment, see your Greenlee distributor... or write for Bulletin E-240A today.

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#### Switch-Leg Size

Q. Is it approved by the code to use No. 14 wire for switch legs for a single light fixture on either 20-30-amp branch circuits?—K.M.

If these switch legs can be kept to a total length of 18 in. they can be so installed. In general, the 1959 Code has been changed so that the switch-leg taps are required to be of the same size and capacity as the main branch-circuit conductors. The size of the branch-circuit tap conductors is now covered in Paragraph 210-19(c), Exception No. 2. Specifically, sub-paragraphs (a) and (b) cover this question.—B.Z.S.—9/61/2

#### Switch Position

Q. Under what section of the code can an inspector reject a job due to the service switch being mounted in a horizontal position?—A.E.

A Paragraph 240-17(c) answers your question, and is as follows: "Enclosures for overcurrent devices shall be mounted in a vertical position unless in individual instances this is shown to be impracticable."

This is another place in the code where an inspector must rule on a special condition according to the practical aspects of the particular job in question.—R.E.W.—9/61/3

#### Grounding Temporary Installation

At a construction site for a missile base, I have come up against a perplexing problem in grounding. To supply power and lighting for construction, the contractor has erected an aerial distribution system around the construction area, consisting of open wires on crossarms supported 70 ft in the air by wooden poles. The power is 480 volts, 3-phase 3-wire delta, supplied from three singlephase delta-connected transformers. The center tap of one of the transformers is grounded at the pole on which the transformers are mounted.

At strategically located poles, distribution centers consisting of safety switches on a plywood backboard provide take-off points for Aerial primary, 7200/12,470 volts, 3 Ø, 4 wire
3-100 kva, 1 Ø transformers connected 480 volts delta on secondary side.
Center tap of one transformer grounded
480-volt 3-wire aerial secondary

Excavated area
Sub-distribution center
(movable) (mov

long rubber-covered cords which extend down into the excavated areas. In the excavated areas, additional safety switches on a skid-mounted frame serve as branch-circuit distribution centers to the utilization equipment. Much of the utilization equipment consists of 440-volt motors. The accompanying sketch illustrates the above description.

Grounding of the motors is accomplished by a grounding conductor in the flexible cord to the motor. However, the conductor eventually returns to a ground rod at the distribution center. In the event of a fault, the current would have to return through this rod to ground, then through earth to the ground rod which grounds the center tap of the supply transformer. This is a high-impedance path which will probably limit the current below that required to operate the branch-circuit protective device.

In addition, the resistance of the ground rod to earth at the distribution center is quite high (approximately 250 ohms). At the location of the utilization equipment, a thoroughly wet surface exists. Thus, it would be possible for a workman to provide a ground path of lower resistance than that provided by the grounding system.

Would the code require a grounding conductor to be carried throughout the distribution system under the above conditions? Are there any acceptable alternate solutions recognized by the code? I have referred to the article "Grounding and the National Electrical Code," by Eustace C. Soares, which appeared in the November 1959 issue of EC&M. From this, it would appear that a grounding conductor



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from the center-tapped 480-volt transformer is required.—D.J.N.

In so far as code rules are concerned, the distribution system under discussion could be grounded or ungrounded, since the maximum voltage of any phase conductor to ground exceeds 150 volts. In fact one phase to ground exceeds 300 volts. According to the provisions of Section 250-5, the code recommends the grounding of an ac system when the voltage to ground does not exceed 300 volts, and it merely recognizes the grounding of systems exceeding 300 volts to ground. This is an alternate procedure recognized by the code with the new 1959 recommendation that such systems be equipped with ground detectors. A literal interpretation of Section 250-5 indicates a preference for grounding when the system operates at 300 volts or less to ground, but it also infers that an ungrounded system is desired when the voltage to ground is greater than 300 volts. In the case in question, only one of the phase conductors operates at more than 300 volts to ground. In view of the fact that the installation is of a temporary nature, where both equipment and wiring may be subject to unusual mechanical injury, it is quite possible that a grounded system properly installed and maintained would be preferred. It also appears that the occasion for system grounding concerns the floodlights served by phase conductors operating at 240 volts to ground.

According to your diagram, we have a situation where the system is grounded at the transformers, but the grounded conductor is not brought to the various distribution centers. As a result, we may have a high-impedance ground circuit which, as you say, will probably limit the current below that reouired to operate the branch-circuit overcurrent device. Mr. Eustace C. Soares has covered this question at considerable length in his excellent article and I believe it would be difficult to successfully refute his contentions.

The 1940 edition of the code required "the grounded conductor of the secondary distribution system to be run to each building served." During World War II, this code provision was deleted by Interim Amendment No. 52, approved June 17, 1942. Conservation of copper may have been a factor. During the past couple of years, inspectors from various sections of our country are inclined to be lieve that the 1940 rule should again be recog-

nized by the code. Undoubtedly Mr. Soares' paper on "Grounding" has emphasized the importance of a metallic ground circuit.

The provisions of Section 250-24 also recognize the significance of grounding at individual buildings as follows:

"250-24. Two or More Buildings Supplied by a Single Service. Where more than one building is supplied by the same service, the grounded circuit conductor of the wiring system of any building utilizing one branch circuit supplied from such service may be connected to a grounding electrode at such building, and in the case of any building housing equipment required to be grounded or utilizing two or more branch circuits supplied from such service, and in the case of a building housing livestock, shall be so connected."

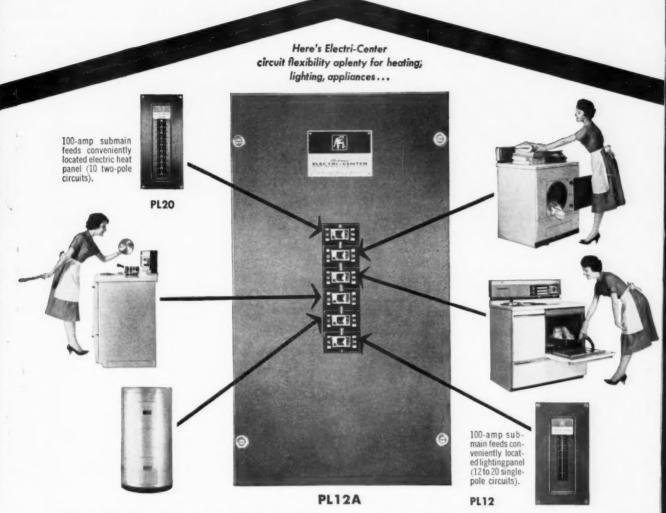
The occasion for this rule was prompted to a considerable degree by adverse experience on farm properties. Made electrodes coupled with equipment grounding only, and a building located several hundred feet from the secondary ground, produced a situation similar to that described in your question. The high-impedance ground circuit would not permit sufficient current to operate the protective device. As a result, potential hazards to people and animals existed for long periods of time, and were only discovered when the farmer lost a cow due to electrocution, or his electrical service bill became fantastic.

In the example shown, I personally believe on the basis of the fundamental Section 250-51 that the degree of safety would be considerably improved, if we considered each "distribution center" as a building, and the secondary grounded conductor be brought to such distribution centers, and again be grounded through a common grounding conductor. Such procedure would provide a metallic low-impedance grounding circuit. On a temporary electrical installation where mechanical injury is a factor of importance, maintenance becomes a prime consideration. The hazard of 480-volt circuits operating at 240 volts to ground should not be discounted. The entire electrical installation should be inspected frequently with particular attention given to the condition of the cords and the integrity of the grounding system. A fault on a cord could introduce a high-impedance path to the grounding electride.—B.A.McD.—9/61/4



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#### Switch Enclosures

Q. Section 373-8 states that "switch enclosures shall not be used as junction boxes, troughs or raceways for conductors feeding through or tapping off to other switches, UNLESS designs suitable for the purpose are employed to provide adequate space for this purpose."

Whose judgment is used in determining whether a switch has adequate space to be used for the abovementioned purposes?—J.E.F.

A. One of the code rules that is frequently used by electrical inspectors is Section 90-7, which states in part: "The administrative authority supervising such enforcement of the code will have the responsibility for making interpretations of the rules, for deciding upon the approval of equipment and materials, and for granting the special premission contemplated in a number of the rules."

Some switch enclosures, which have much more space than others of the same rating, could be used in a limited way as outlined in Section 373-8. On the other hand, some switches and similar equipment are only designed with clearances to accommodate a limited number of conductors (usually line and load conductors) and cannot be used for other purposes. In any event, it is much more desirable to provide auxiliary gutters or similar enclosures to distribute wiring at a group of safety switches.-R.E.W. -9/61/5

#### Raceways Exposed to Different Temperatures

An installation of switches mounted on the outside of a cold-storage vault has a hub at the bottom rear of the switch and feeds through the wall in conduit to a point immediately inside of the vault where a seal-off of the selfdraining type is installed. At this point, a rubber-covered (3-conductor, one for grounding the lighting fixtures) conductor cable runs up to the ceiling where the lighting fixture must be installed. This type of installation has not given any trouble to date and we want to know if it is satisfactory according to the NEC.-A.B.

A. Yes, provided the conductors are of the proper approved

type and the installation is approved for the location. Section 300-6 recognizes and requires sealing-off of the different sections of the conduit systems pretty much in the manner in which you describe in your general statement.—B.Z.S.—9/61/6

#### NEC Official Interpretations

Six official interpretations of the current edition of the National Electrical Code have been announced by the National Electrical Code Committee of the National Fire Protection Association, effective April 25, 1961. Each interpretation has been developed through the established committee procedure in response to requests and has been reviewed and released by the NFPA Electrical Correlating Committee.

Subject matter and official texts of the interpretations follow:

#### INTERPRETATION NO. 462

Subject—Installation of intrinsically safe control circuits in hazardous areas.

Statement-A low-voltage, lowcurrent electrical circuit of such value that the circuit may be considered intrinsically safe has been designed for use in hazardous locations so that nonhazardous controls may be placed in the hazardous area to actuate circuit interrupting equipment installed outside the hazardous area. This circuit - interrupting equipment controls high-energy circuits to equipment in the hazardous area. Both the high-energy circuits and equipment in the hazardous area are to be installed in full conformance with the applicable provisions of Article 500.

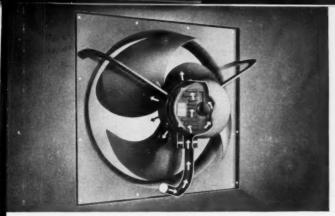
Question—May the intrinsically safe control circuit utilize, as part of the return circuit, the metal enclosure in which it is run without being in violation of the intent of the National Electrical Code?

Answer-No.

#### (Sections 210-7 and 250-112)

Subject—Grounding of nonmetallic sheathed cable in a new installation.

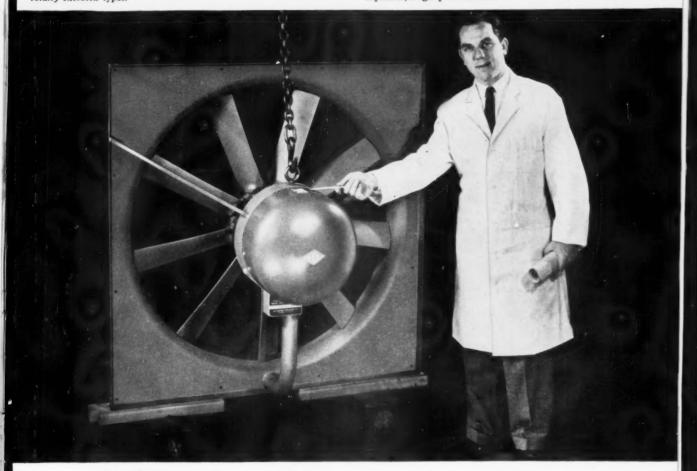
Statement-Grounding receptacles



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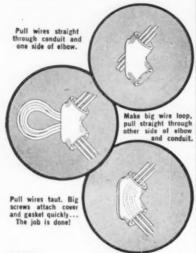


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on a new installation are installed as specified by Sections 210-22(b) and 250-59. The branch-circuit wiring method is nonmetallic sheathed cable 14/2 without grounding conductor. A separate No. 14 copper conductor is installed as a grounding conductor from an adjacent water pipe to the grounding contacts of the grounding-type receptacle. Proper fittings and devices are used as required by code.

Question 1-Is the intent of Section 210-7 complied with under the above-outlined condition?

Answer-No.

Question 2-Is it the intent of Section 210-7 that the grounding conductor be an integral part of the cable assembly supplying the grounding type receptacle?

Answer-Under the condition noted-yes. On existing two-wire nonmetallic-sheathed cable, grounding may be through separate conductors to adjacent water pipe, as indicated in the last sentence of paragraph (a) of Section 250-112.

#### INTERPRETATION NO. 465

(Sections 230-90 and 230-70-g)

Subject-Capacity of service-entrance conductors when oversized feeders and main breakers are used to reduce voltage drop; also the provision of a separate circuit breaker without use of a main disconnect in an emergency lighting circuit placed ahead of the main circuit breakers.

Statement No. 1-The calculations for the wiring of a commercial establishment indicate that six feeders, each with conductor capacity of 100 amps, would be ample to serve the load. This would normally require six 100amp circuit breakers and serviceentrance conductors of proper capacity for the calculated load. For the purpose of preventing voltage drop, however, two of the feeders were increased to 150-amp sizes each, and four were increased to 125-amp sizes each, and circuit breakers corresponding to the increased feeder sizes were proposed.

Question No. 1-In view of the increased circuit-breaker ratings but with no increase in calculated load would the service-entrance conductors as originally calculated comply with Section 230-90 of the code?

Answer-Yes

Statement No. 2-In the same layout just described, a separate circuit ahead of the six main circuit breakers is desired for emergency lighting as permitted by Section 230-72.

Question No. 2-Would the provision of a separate circuit breaker for this emergency lighting circuit, without the use of a main disconnect, comply with paragraph (g) of Section 230-70?

Answer-Yes.

#### INTERPRETATION NO. 466 (Section 250-92-a)

Subject-Installation limitations on a bare No. 6 grounding conduc-

Statement No. 1-A bare No. 6 system grounding conductor for a commercial building is 120 ft long. This conductor runs through a 4in. concrete slab without being encased in conduit, electrical metallic tubing or cable armor.

Question No. 1-Is this permitted by Article 250, Section 250-92(a) of the NEC, 1959?

Answer-No.

Statement No. 2-Same situation as in "1" but the bare No. 6 system grounding conductor is laid on a sandy loam without conduit. electrical metallic tubing or cable armor enclosure and a 4-in. concrete slab poured over it.

Question No. 2-Is this permitted by Article 250, Section 250-92(a) of the NEC, 1959?

Answer-No.

Statement No. 3-Same situation, but the bare No. 6 system grounding conductor is run perpendicular through a 4-in, concrete slab and run below the slab in earth at a depth of 1 ft without a conduit, electrical metallic tubing, armor cable enclosure.

Question No. 3-Is this permitted by Article 250, Section 250-92(a) of the NEC, 1959?

Answer-No.

Comment—Attention is also called to Section 230-30(a), Exception No. 2.

#### INTERPRETATION NO. 467 (Section 230-4)

Subject-Application of the 300volt-to-ground limitation with regard to the installation of a bare



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neutral on customer-controlled services.

Question—On customer-controlled services, does Section 230-30 permit a bare neutral regardless of the voltage to ground, or does the 300-volt-to-ground limitation of Section 230-4 apply?

Answer—The 300-volt-to-ground limitation of Section 230-4 applies.

#### INTERPRETATION NO. 468 (Notes to Tables 1, 2, and 3, Chapter 9)

Subject—Application of code requirements to the cable assembly connecting a combination ventilating hood and control panel for installation over a counter cooking unit, the entire assembly being one approved by a recognized testing laboratory.

Statement-A manufacturer provides a combination hood-type ventilating-fan and control panel for installation over a counterinsert cooking top. The manufacturer also provides as part of the assembly a length of flexible steel conduit (maximum length 15 ft) enclosing heat-control switching conductors, which terminate in female-type plug-in connectors for connecting the hood and the heating sections together. Connection to the branch-circuit conductors is made at the combination ventilating hood and control panel. The entire assembly, including the connecting length of flexible seel conduit, is approved by a recognized testing laboratory.

Question No. 1—Is it intended that Section 210-19, paragraph c, Exception No. 2 be applied to the cable assembly connecting the combination ventilating hood and control panel to the cooking top unit?

Answer-No.

Question No. 2—Is it intended that Table 3, Chapter 9, be applied to the cable assembly connecting the combination ventilating hood and control panel to the cooking top unit?

Answer-No.

Comment—The short length of flexible steel conduit and the enclosed conductors are considered to be a part of the wiring of the appliance and as such are covered by the requirements of the standard under which the product is approved by the nationally recognized testing laboratory. See Section 90-8.



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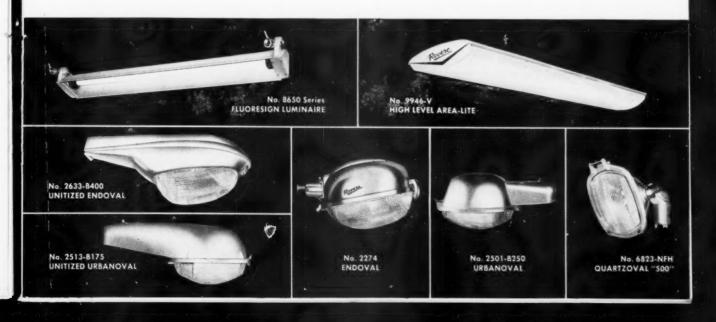
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#### In the News

#### Western Plant Maintenance Conference Staged in Los Angeles

Major theme for a 2-day Plant Maintenance Conference held in Los Angeles, July 18-19, was How to Increase Profits by Reducing Overhead. Concurrently, an informative exhibit of practical products and services related to the maintenance field indicated that, as new production equipment grows in complexity, more sophisticated test equipment and maintenance knowhow is demanded of (and available to) men entrusted with this responsibility. As stated by Chairman L. C. Morrow, consulting editor, Factory, "The conference was short on theory but long on facts based on practical experience."

In the interest of national economy, the conference offered recommendations for avoiding costly shutdowns and improving maintenance efficiencies, and it also showed how savings in maintenance costs could directly improve over-all industrial profit margins. As indicated by this review, discussions were directly concerned with management, engineering and executive-level policy-making problems rather than with basic how-to technique or procedures. Emphasis was placed upon human relations and leadership, organization and delegation of responsibility, work measurement and incentives, maintenance planning and scheduling, budgets and indirect costs, engineering and labor-management coneiderations

Organizing an effective 400-man maintenance division in a metal fabrication plant was the subject of a talk by Robert G. Keizur, superintendent of maintenance planning, Kaiser Aluminum & Chemical, Spokane, Wash., who maintained that only by planning can a maintenance supervisor control schedules and work backlog, develop budgets and cost-control procedures. keep accurate records of machine histories and repair costs, develop work standards and determine production performances. Maintenance is a costly necessity, he said, although it is possible to reduce those charges (on a per-unit-of-production basis) by proper budgets, schedules, controls and by promoting "receptive attitudes" with management and operational representatives. These various points were



**ENGINEERING PANEL** discusses highlights of electrical facilities at Milan's Restaurant, Chicago's first "Gold Medallion" restaurant. Answering questions of architects and engineers at preview are (L to R): Jack Pohl, commercial cooking specialist, Commonwealth Edison Co.; Dick Wagoner, district sales engineer, Carrier Corp., heat pump supplier; Ion Caloger, consulting engineer; and Bob Geyer, architect and engineer, Commonwealth Edison Company.

illustrated with actual experiences and examples, while an unusually active question-answer session indicated the high interest of those in attendance.

Many of Keizur's conclusions were echoed by Kendall J. Gibson, superintendent, Mechanical Div., American Oil Refinery, Casper, Wyo., who discussed reorganization of his maintenance set-up from a traditional craft type to an area responsibility arrangement. Placing needless emphasis upon jurisdictional lines had lessened efficient use of maintenance labor, he maintained; a fact which was acknowledged by union representatives who cooperated with the changeover.

When need for this change had been recognized and anticipated benefits had been examined, new procedures had been planned and endorsed by all interests involved (management, labor, production, maintenance). This changeover had involved training programs to improve supervisors' knowledge of craft details, psychology, leadership and delegation of responsibility, he said. Gibson then reviewed procedures for scheduling labor and materials for normal and emergency maintenance assignments, arranging planned shutdowns, writing job tickets and maintaining inventories. He also stated that, by informing all persons of true objectives and costs, cost-consciousness had improved all along the line: and, instead of routinely calling for a maintenance crew, supervisors

now reconsider their requests, frequently scaling-down or cancelling their demands, planning more carefully and thereby conserving maintenance manpower and dollars.

Principles pertaining to planning and scheduling also were discussed by R. H. Price, maintenance superintendent, Pittsburgh Plate Glass, Corpus Christi, Texas, who defined planning as "detailed analysis of specifics, equating their importance to over-all objectives," and scheduling as "putting the right men on the job at the right time with the right tools and materials." He maintained that proper planning requires knowledge of the type of operations involved (heavy or light, bench work or jobsite, etc), complexity and scope of the work, also whether the job is routine, repetitive or non-standard in nature.

Price advocated using a combination of craft-area operations, permitting crafts to handle large or special jobs while area crews take care of jobs of lesser scope or complexity. He also stated that strict adherence to a preplanned daily work schedule was not a sacred obligation, since control foremen should have the ability and authority to make changes in the field if necessary.

In a closely related talk, Robert N. Marcum, manager of plant services, Hughes Aircraft, Newport Beach, Calif., discussed planning of engineering and maintenance budgets, declaring that the subject includes an understanding of man-



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ACTION COMMITTEE for the 1961 Electrical Maintenance Conference included (left to right, rear row) Walter Collins and Lloyd Gates, Los Angeles Dept. of Water and Power; Paul Henrichs, Southern California Edison Co.; Bob Proctor, Larson-Hogue Elec.; also (front row) John Horsburgh, Kaiser Steel, and Bill Paluska, Albert C. Martin & Assoc.

power, space and cost controls as well as expenses and capital factors. Marcum stated that cost-control systems should be equated as running records of performance against budgets for controllable costs; should have a responsible signature authorization system; should provide for the monitoring of material requisitions; and should include weekly or monthly reports to all plant engineering supervisors concerning budget, dollar goals and dollar performance. Plants which will make profits in a competitive market are those which can accurately forecast required expenses, accurately perform against operating budgets, and take full advantage of available facilities, manpower and materials to obtain consistent profits, he stated,

#### **Work Evaluation**

Work sampling and work measurements were likewise explored by Donald L. Wheeler, director of industrial and plant engineering, Robertshaw-Fulton Controls, Long Beach, Calif., and by T. Blair Evans, deputy chief for industrial engineering, Wright-Patterson Air Force Base, Ohio.

After reviewing various methods for obtaining basic information relating to job evaluation, Wheeler concluded that maintenance is an indirect cost, and that indirect costs usually represent great potential savings in plant operation because traditionally they have been subjected to the least control. One reason for this is the tradition of individual craftsmanship; another reason being that much of the work is noncyclic and therefore never standardized. However, work sam-



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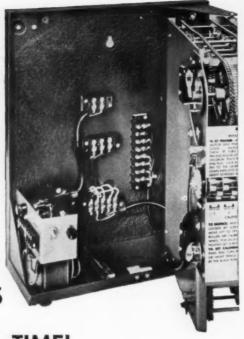


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INDUSTRIAL PLANT maintenance was topic of discussion by panelists Frank S. Miller, plant engineer, Robertshaw-Fulton Controls; Dr. Henry Lee, technical director for The Epoxylite Corp.; Frank Pierce, electrical engineer with the Los Angeles Refinery of the Union Oil Co. of Calif.; Dick Pehl, maintenance superintendent for Kaiser Steel, and Robert Marcum, manager, Plant Services, Hughes Aircraft Co. Discussion took place at 7th conference of the Electrical Maintenance Engineers Association of Calif.

pling now provides a reliable tool for measuring various aspects of these relatively uncontrolled cost areas.

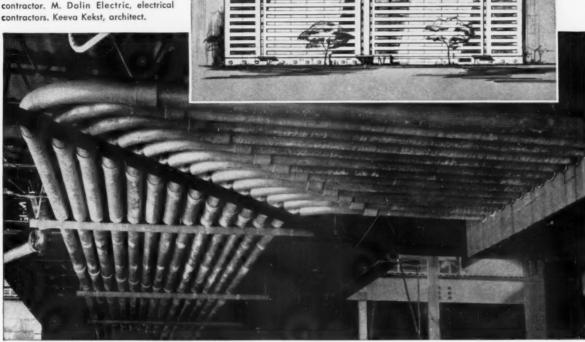
Evans maintained that control of manpower can only come from establishment of time standards for performing various jobs, because control is only possible when standards exist. Valid standards, however, should be consistent, accurate, attainable and acceptable, although non-repetitive jobs employing nonstandard methods should not be included in this approach. Evans concluded with a note of caution; stating that whenever performance measurements are applied, workers generally are motivated towards producing more work with less actual hours of labor input, whereas maintenance men should be motivated towards the necessity for less work rather than more.

Indirect labor costs were also considered by Harry Monroe, general foreman of maintenance, North American Aviation's Rocketdyne Div., Canoga Park, Calif. Monroe contended that the ability to secure competitive business in fields where a few cents per unit may be the difference between successful or unsuccessful bidding requires that intelligent management keep changing conditions under constant surveillance. Money can be saved simply by not spending, he said, but work must be performed if products are to be produced, and work involves costs, many of which, such as maintenance, are indirect and therefore difficult to define or control. Reduction of indirect costs

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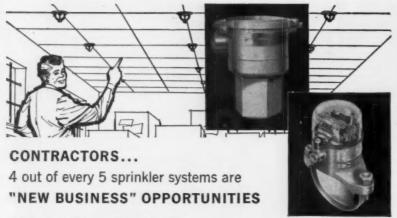
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A PRODUCTIVE CLIMATE for maintenance-management cooperation was subjected to critical consideration by EMEA conference speakers Floyd O. Nelson, head of Electric Dept., Rome Cable Div. of Alcoa; Regis Gubser, vice president in charge of engineering for Calif. Consumers Corp.; Bernard A. Shrive, electrical superintendent for Kaiser Steel, and Donald K. Higgins, special project engineer, American Potash & Chemical Corp.

are possible, however, by having a clear concept of budgets and available funds; knowing factors that can be controlled; analyzing actual requirements, classifying needs to determine minimum frequencies and eliminating work performed in excess of minimum requirements; establishing goals and responsibilities; determining levels of work accomplishment, then taking proper action by preparing supervisors through management development programs and stimulating competitive action through departmental ratings.

Basic questions concerning what management, engineering and maintenance departments want from each other were answered by B. J. Sturman, Jr., manager, Pacific coast region, Manufacturing and Repair Div., Westinghouse, Sunnyvale, Calif., and by W. J. Smith, section head, plant engineering, Goodyear Aircraft, Litchfield Park, Ariz. In this discussion, Sturman reminded delegates that American industry is facing a profit squeeze; that Commerce Department statistics indicate that national maintenance costs are now somewhere above \$14-billion annually; that this represents 5% of the total sales dollar of companies represented by the statistics, and that it is estimated that over \$4-billion is wasted needlessly due to inefficient maintenance operations.

Two decades ago there existed a 20-to-1 ratio between operating and maintenance personnel, he continued, whereas today the ratio is generally less than 10-to-1 and, in some industries, as low as 1-to-1; these figures indicating the growing importance of the entire maintenance concept. Sturman urged



Ernest R. Vick (left), Secretary-Treasurer, and Duane Lintecum (center), President, Vick-Lintecum General Contractors, Inc., North Kansas City, Mo., showing Don Bevan, their Dodge Representative, around one of their current jobs.

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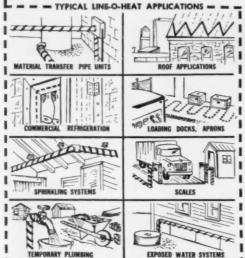
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PROGRAM CHAIRMAN C. D. Gibson checks platform facilities with Dr. Harry Helson, professor of psychology, University of Texas, prior to IES session on research contributions to lighting progress at regional meeting in Sacramento.

those in attendance to find consistent systems for assigning job priorities, determining accurate manpower and material requirements. maintaining safe working conditions, maintaining complete reference libraries of instruction manuals and drawings pertaining to equipment under their responsibility, and to seriously apply "make or buy" principles to maintenance; weighing costs of in-plant activities against maintenance through contracts with outside firms. Referring to growing know-how, new techniques and new products available, Sturman concluded by saying, "If you are doing your jobs as you did them a decade ago, chances are 10-to-1 you are doing them wrong," since today's competitive status dictates constant progress through change.

On the other side of this management-engineering table, Smith responded that plant engineering is a service organization and should justify its existence by providing the best service that management is willing to afford. However, if maintenance and engineering are to function economically and efficiently, it is imperative that management provide those departments with a voice in management, authority commensurate with responsibility, proper equipment, adequate manpower and money to do their work effectively. If any service group is not qualified, then it is the responsibility of management to initiate changes, he said. However, if management concedes that these departments are experts in their fields and are rendering valuable service, then their advice should be sought and heeded in those cases where the specific de-

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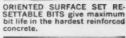


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Motors and similar equipment in your plant use both kilowatts (working current) and kilowars (magnetizing current). The kilowatts you buy from your electric company. The kilowars you can best supply yourself with Sprague power factor correction

capacitors. And the more you supply, the greater your useful power, the less the load on present wiring, the lower your electric bill.

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Elegant New Companion\*



Everywhere . . . people prefer White-Rodgers electric heat wall thermostats—universally famous for styling, easy installation and years of trouble-free performance.

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partments are involved with subsequent operations.

How plant managements can get the most from their electric-power investments was the subject of a talk by Carroll M. Cole, rate application engineer, Dept. of Water and Power, Los Angeles, who discussed rate-making procedures, demands, load and power factors, fuel adjustments and other related charges. He also advised those present to seek advice from local utility consultants concerning most favorable rates, primary voltages, transformation and distribution methods.

Engineering and constructing plant facilities was a panel subject discussed by Henry D. Wood, plant engineer, Armco Steel, Los Nietos, and by J. F. Gardner, plant engineer for ground systems, Hughes Aircraft, Fullerton, both of California. In this discussion, Wood declared that planning and construction work alike involves continuous evaluation from technical, human and financial viewpoints, and that when engineers are given assignments for projects, they should be acutely aware of those interested in the project; what decisions already have been made by whom; to what extent those decisions can be revised; and whether the work is to be performed by their own crews or by outside contractors. Wood also mentioned that management rarely is interested in, or capable of appreciating, all engineering details. Therefore key construction plans should be simplified for their benefit, including furniture and equipment layouts in template form to provide scale, and including cranes, lighting, ventilating and air conditioning, power equipment and distribution symbols for basic understanding. Many people cannot visualize a completed project from plans and specifications, he said, so it is the responsibility of engineers to prevent any misunderstandings.

Gardner maintained that persons responsible for planning any engineering action should assemble all pertinent information, evaluate it as to validity, determine what methods and alternates are feasible to attain the objectives, then recommend courses of action. He also urged management to be specific in their directions, concluding with the statement that "As-good-aspossible does not provide adequate quality control; as-soon-as-possible is not a schedule, and as-cheap-aspossible is not a method of cost control."

These various discussions were presented in a series of ten sessions

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Give you the most light per dollar... because a new Westinghouse electrode virtually eliminates arc-tube blackening... major cause of mercury lamp deterioration! As a result, new Lifeguard lamps are rated at a full 12,000 hours economical service life, and give up to 25% more light throughout their 70% longer life.

Lifeguard lamps (available in 100 to 1000 watts) are made of Weather Duty<sup>T</sup> hard glass for extra dependable service indoors, or out. They will not crack or craze when exposed to rain, sleet, snow, thermal shock, or corrosive industrial gases.

The Lifeguard lamp is just one of the many types of

Westinghouse lamps designed to save you money. Take advantage of the Westinghouse Lighting Cost Reduction Plan and cut your lighting costs in one or more of the following ways: (1) Reduced cost of lamp purchases; (2) Reduced lamp replacement labor costs; (3) Increased lighting level for the same or lower power costs; (4) More efficient use of power. For complete information, call your Westinghouse Lamp Agent...or your nearest Westinghouse Sales Office. You can be sure... if it's Westinghouse.

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Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield 2, N.J.



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See for yourself that Blackhawk EMT fittings have full, true, perfect threads for ease and speed of installation. Bodies of heavy steel or malleable iron—cadmium and zinc finished to eliminate corrosion on the unit itself. Blackhawk's new EMT fittings are rain tight. Quality controlled at every phase of the manufacturing. Available in complete range of sizes.

Find out why these small, easy to use fittings are best for any electrical job, large or small.



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during the 2-day conference; sessions being variously chairmanned by L. C. Morrow; E. M. Goodbar, maintenance superintendent, Columbia-Geneva Steel, Pittsburgh, Calif.; T. E. Thal, plant project engineer, McCulloch Corp., Los Angeles; W. F. Faith, managing director, Air Pollution Foundation, San Marino, Calif.; James M. Weeks, plant engineer, Proto Tool Co., Los Angeles; John P. La Forge, engineer, Mobil Oil, Los Angeles; H. J. McKeever, manager, apparatus service shop, General Electric, Philadelphia; B. P. La Forge, plant engineer, Consolidated Electrodynamics, Pasadena; J. J. Frederickson, superintendent, maintenance and construction, Tidewater Oil, Martinez, Calif.; and W. E. Fore, plant engineer, North American Aviation, Los Angeles.

Over-all objectives of this conference for management and maintenance executives were summarized succinctly by R. L. Saling, chairman of the conference and show Board of Sponsors and regional manager of maintenance products for Westinghouse, who pointed out that "America's high standard of living offers an inherent competitive advantage to foreign companies where workers are paid lower wages, and this advantage can be overcome only by our increased technical efficiencies and improved maintenance techniques which, in turn, can benefit from an interchange of practical ideas from responsible authorities attending meetings such as this."

#### National Electrical Week

"Electricity Powers Progress" will be the theme of the 1962 observance of National Electrical Week, which is scheduled for February 11-17. The announcement was made by Harold A. Webster, president of the National Electrical Contractors Association and chairman of the National Electrical Week Committee, following a meeting of the full committee.

Mr. Webster and the three officers who served to head the 1961 NEW Committee were all re-elected for the 1962 Committee at the same meeting. They are: T. O. McQuiston, vice president, Metropolitan Edison Company, who was reelected vice-chairman, A. W. Hooper, executive director, National Association of Electrical Distributors, re-elected secretary; and L. W.



**HAROLD A. WEBSTER** is chairman of National Electrical Week, which will be held February 11-17, 1962.

O'Brien, relations services, General Electric Company, re-elected treas-

In announcing the theme, Mr. Webster said: "The electrical industry intends to concentrate its efforts during the next National Electrical Week on informing our nation of the vital role electricity plays in our economy, our national defense, and our determination as a nation to improve our standard of living.

"The size of our country's electrical industry, electrical output and consumption made up one of the most significant yardsticks of our progress," he continued. "More and more ways are being found to put electricity to work for us—in science, industry, research, on farms and in the home. Electricity, possibly more than any other source of energy, is responsible for the high standard of living we now enjoy and for the great advances destined to take place in this decade.

"It staggers the imagination to envision our life without electricity," Mr. Webster said. "It is the lifeblood of our day-to-day living and the unlimited source of energy for tomorrow's advances. The NEW Committee believes that the theme 'Electricity Powers Progress' will help to drive home to all Americans—those in the electrical industry and the public at large—the importance and need for continuing growth of this giant force and industry, which contributes billions of dollars annually to the national economy."

For the 1962 observance of NEW, the Committee will again distribute planning guides and ma-

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The "SCOTCH" Brand Electrical Tape No. 33 used to wrap this splice, protects it against sun, wind, rain, sleet, and other adverse weather conditions. Easily applied, it provides a dependable insulation cover that lasts for years . . . costs only a few cents. When tape costs so little, can you afford less than the best?

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adheres instantly, holds permanently, without creeping or end-lifting. Low power-factor provides excellent insulation . . . high electric strength, wet or dry. For every job you can put your confidence in "SCOTCH" Brand Electrical Tape No. 33.

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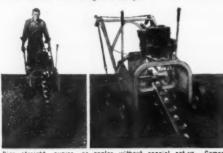


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terials for nationwide and local observances of the Week. Last February, NEW activities were carried on in more than 300 communities in this country and in Canada. It is anticipated that this number will be surpassed in 1962 as a result of the now firmly established recognition of NEW as an important activity by the various segments that make up the electrical industry.

National Electrical Week is sponsored by most of the industry's leading trade groups—manufacturers, contractors, distributors, utilities, leagues, labor, service and repair groups. The 1962 NEW Committee is made up of representatives from all of the sponsoring organizations.

#### Common Trench for Underground Cables

The first field trials in the U.S. of power and telephone cables installed with random separation in a common trench will soon be under way in the Chicago area. Authority to do this on a limited basis was granted to Commonwealth Edison Company and Illinois Bell Telephone Company by the Illinois Commerce Commission, July 25, 1961. This followed a petition of the two companies documented with experiences with joint burial construction and results of extensive EEI-Bell Lab tests conducted last year. Limitations restrict installations to primary service at 7.2/12.4 kv or less for 10,000 homes in not more than 100 projects between now and June 1963

Under the new order, the requirement of at least a 12-in. earth separation between power and telephone cables (in the same or separate trenches) will be waived. Cables may be installed with random separation at the same level in a common trench. This, the order states, can reduce trenching and backfilling costs by about 25% and should stimulate the use of buried cable construction.

Engineering recommendations for the new installations include the following:

1. Power and telephone cables may be installed at the same depth with random separation in a common trench even though there will be no separation at some points. However, separations obtainable without cost penalty are desirable.

2. The underground portion of the power distribution circuit should be protected by a device capable of clearing line-to-ground faults in 12 cycles or less.

3. A bare neutral should be installed either as a separate conductor in close proximity to the primary cable or as metallic sheath or concentric conductors over the outside of the cable.

4. All existing grounds should be interconnected at each transformer location. These include primary and secondary neutrals, power cable shield or sheath, and telephone cable sheath.

5. Common grounding of secondary neutral, telephone protector and shield of telephone service cable

should be made at each service entrance in conformance with NEC

6. The metallic sheath of the telephone cable is to be bonded to the power system grounded neutral at intervals of not more than 1000

Based on past experience with the types of cables to be used and the results of tests mentioned, the petitioners consider negligible the risk of personal injury or property damage which might result from random separation of the two cables in a common trench. Since the telephone cable is to be sheathed and grounded, inductive interference is not anticipated.

Electrical characteristics of the cables to be used are listed as follows:

For 7.2 kv the cable shall consist of a No. 4, 19-strand tinned or alloy coated copper conductor, strand shielded with a 19/64-in. wall of ozone-resistant butyl-rubber insulation, a 30-mil thick semi-conducting bedding or jacket over the insulation, and a covering of 12 No. 14 tinned or alloy coated uninsulated soft-drawn copper wires wound spirally with equidistant spacing around the circumference of the cable with a lay of from 5 to 7 in.



UNDERGROUND DISTRIBUTION in Chicago area residential development feeds pad-mounted transformers like this. Secondary services to homes go underground.



Ollie Windhorst, owner, Reddy Electric Co., Inc., Louisville, Kentucky

#### General Electric's new "square silhouette" baseboard heaters with standard thermal cut-out.

Attractive "square silhouette" baseboard heaters head the list of pacesetting all-new electric comfort heating equipment—designed, engineered and manufactured by General Electric. Safe linear thermal cut-out is standard equipment on all models. The dependable General Electric Calrod® heating unit is equipped with radiating fins for fast heat recovery.



INSTALLATION IS EASY: (1) heating element requires no disassembly, (2) wiring connections are easily accessible in tront, (3) all covers, end caps and corner pieces snap into place, (4) ample space along raceways for wiring and interconnecting heaters, and (5) sections are easily joined at either end.

FREE LITERATURE: for complete details and specifications, write 49-113-5, General Electric Company, Electric Comfort Heating Section, Appliance Park, Louisville 1, Kentucky.

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## YOU ASKED FOR IT— the May 1960 feature section of Electrical Construction and Maintenance now in a

the May 1960 feature section of Electrical handsome hard-cover book.

#### CONSTRUCTING ELECTRICAL SYSTEMS

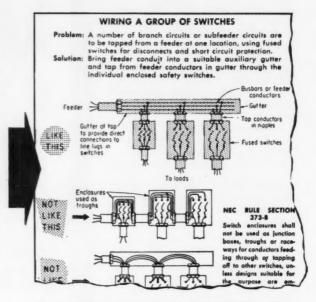
by J. F. McPartland and the Editors of Electrical Construction and Maintenance

Here's a modern, comprehensive reference and instruction manual on the methods and techniques used in constructing systems for power, light, signals and communications. Covering the best practice on selecting, mounting, connecting and housing all types of electrical equipment, this manual presents 1959 National Electrical Code data relating to installation. And a wealth of special illustrations are used throughout to clarify fine code points.

Chapters are broken down on the basis of types of equipment to facilitate ready reference: lighting equipment - motors and controllers - conductors - raceways - switches - overcurrent protective devices - switchboards and panelboards — transformers — capacitors and regulators — power sources high voltage - signals and communications.

CONTRACTORS - Get copies of this book for your job superintendents, foremen and estimators. They'll appreciate the gesture and you'll get a high return on your investment.

ENGINEERS - This book is a bonanza of information in the area where electrical design encounters most difficulty. Get copies for your key designers, junior engineers and draftsmen working into design.



PLANT ELECTRICAL PEOPLE - This book should be in the reference library of plant electrical engineers, electrical supervisors and electricians.

ELECTRICAL INSPECTORS - Here's a unique presentation of code rules in combination with specific installation details taken from modern practice. The correlation between code generalities and actual job specifics will assist inspectors in many difficult rulings.

#### CONTENTS

**General Considerations** Luminaires and Lighting Equipment Motors and Controllers Conductors Raceways **Switches** Overcurrent **Protective Devices** Switchboards and Panelboards **Transformers** Capacitors and Regulators **Power Sources** High Voltage Signals & Communications

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**TELEPHONE PEDESTAL** for underground telephone service in the same development is a number of feet away from the power cables. Under Illinois Commerce Commission trial installation order, power and telephone distribution cables will be in same trench without earth separation.

Or, the 7.2-kv cable can be a No. 4, 19-strand copper conductor, strand shielded, with a 14/64-in. wall of polyethylene insulation, a semi-conducting covering over the insulation, and a finite lead sheath overall.

The 2.4-kv cable shall consist of No. 4, 19-strand aluminum conductor, with 10/64-in. insulation of ozone-resisting butyl rubber, jacketed with 4 in. of non-conducting heavy-duty black neoprene and a covering of seven No. 14 tinned or alloy coated soft or annealed copper wires wound spitally with equidistant spacing around the circumference of the cable with a lay of from 4 to 5 in.

The telephone cable shall consist of a core of fine gauge (No. 19 to No. 26) copper wires, the number of pairs to vary with service requirements. Individual wires will be insulated with an extruded layer of polyethylene. The entire core will be wrapped with Mylar or Polypropylene. The wrapped core will be further sheathed in an 8-mil aluminum envelope and an outer 65-mil jacket of extruded polyethylene.

Under terms of the Commission order (limited exemption to Section 9 of General Order 160) and pursuant authority, neither petitioner is permitted to dig up a cable, if a fault should occur, unless a representative of the other is present. The only exception to this requirement, scheduled to end Jan. 1, 1964, is an emergency requiring immediate action.

Commonwealth Edison Company and the Illinois Bell Telephone Company, now plan to approach a number of home builders in the Chicago metropolitan area to secure their cooperation in the authorized field trials,



## Free booklet tells you what to look for in a pressure-sensitive tape

Here's a handy, new booklet that gives clear, concise answers to nearly any pressure-sensitive tape problem. It's based on Johns-Manville's long years of experience in the manufacture of tapes for electrical and industrial applications. It's called "How To Select A Pressure-Sensitive Tape," and tells you how to effect important economies; help speed production; eliminate knotty mechanical difficulties. It tells:

- Why the adhesive qualities of a tape are as important as the backing material
- . What causes tape failure; and how to prevent it.
- · A glossary of terms associated with pressure-sensitive tapes.
- · A complete list of authoritative technical data files available.

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## G!w

## CABLE NIGHTCAPS

#### Seal Unfinished Cable Joints Against Moisture And Dirt



Cable splicing no longer need be one continuous operation when G&W Cable Nightcaps are used. Unfinished cable joints or terminations can be left overnight or for several days at a time with complete assurance that work will remain dry and clean as when sealed.

The G&W Cable Nightcap consists of a heavy plastic sleeve, waterproof paper to keep the plastic clean, tape, desiccant, and humidity indicator. The sleeve is slipped over the unfinished joint and one end taped tightly to the cable. Desiccant and humidity indicator are then inserted into the sleeve and its remaining end taped to the cable on other side of the joint. Waterproof paper is laid over the sleeve for protection.

Further information on the Cable Nightcap is available from G&W Electric Specialty Company or consult your local G&W representative.



#### G&W ELECTRIC SPECIALTY COMPANY

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CANADIAN MFR. • POWERLITE DEVICES, LTD. TORONTO, MONTREAL & VANCOUVER

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CHECKING ELECTRICAL PLANS fo

CHECKING ELECTRICAL PLANS for large Portland, Ore., department store are Ed Kozlowski, foreman, and Al Appleton, coordinator for W. R. Grasle, the electrical contractor and engineer in a 5-level 7-acre project. Picture above was snapped in trailer office parked on the jobsite.

#### **EASA News**

Four EASA chapters—Great Lakes, Western Michigan, Central Ohio and Greater Cleveland—met in Toledo on August 21 for a day of golfing and a round of business and social activities. Bud Romanoff, Ontario Equipment Co. and Dick Romanoff, Romanoff Electric Co., both of Toledo, were hosts.

A round of chapter meetings is scheduled for fall after a summer hiatus. Some of the larger meetings include:

 Heart of American Chapter, at Mickey Mantle's Holiday Inn, Joplin, Mo., September 13-14;

• Southwestern Chapter, a Kingston, Okla., October 5-7;

• Southeastern Chapter, at Dinkler Plaza Hotel, Atlanta, Ga., November 2-4.

The first meeting of the 1962 convention committee was held in Chicago at Como Inn on July 26. More than 25 members attended along with the new EASA executive vice president August A. Baechle. The convention will be held in Chicago at the Conrad Hilton Hotel, June 10-13, 1962.

Paul Sievert, of Sievert Electric Co., and Robert Kaska, of Chicago Electric Co., both of Chicago, were named co-general chairmen of the 1962 convention. Assisting them will be Sigmund Pluskota, Pluskota Electric Co., Chicago, president of the Central District Chapter of EASA, and the following committees:

Program Committee — Joseph Ferrari, Excel Electric Co., Chicago, chairman; and Bill Kaska, Chicago Electric Co., Chicago, and

## Midwest

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CHOICE OF FUSED OR

FOR FARMS, RANCHES, MOBILE HOME PARKS, INDUSTRY, OUTDOOR CONSTRUCTION!

MODEL P-55-F, as illustrated, has a 50 amp, 250 volt, 4 wire power receptacle, protected with a 2 pole, 60 amp pull out block. Also has a grounded type duplex receptacle protected with a separate fuse. U-L Approved!

Top hub and three KO's in bottom facilitate overhead or underground connections.

#### COMPLETELY TAMPERPROOF

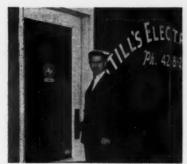
Cover closes completely when in use and can be padlocked to eliminate tampering. Also Circuit Breaker Model similar to model illustrated, with circuit breaker replacing the fuses.

A COMPLETE LINE OF STANDARD MODELS TO CHOOSE FROM IN FUSED OR CIRCUIT BREAKER TYPES WITH 15 TO 60 AMP, 3 and 4 WIRE RECEPTACLES.

OVER 100 DIFFERENT MODELS!

SEE YOUR LOCAL ELECTRICAL DISTRIBUTOR OR WRITE . . .

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OWNER JERRY STILL of Still Electric Co., Decatur, III., poses before the new EASA emblem on his shop door. Mr. Still opened his own business in 1958, started training vocationally handicapped persons in electrical apparatus service a year later as part of a unique program conducted by the State of Illinois.

Hans Westphal, Westphal & Co., Janesville, Wis.

Entertainment Committee—William Luebker, Hyre Electric Co., Chicago, chairman.

Exhibit Committee—Abe Marcus, Ther Electric & Machine Co., Chicago, chairman; Arthur Wagner Sr., Wagner Electric Co., Chicago.

Publicity Committee—Abe Marcus, Ther Electric & Machine Co., Chicago.

Reception Committee—Ted Hankins, Condo Electric Co., Chicago, and Fred Westphal, Westphal & Co., Chicago, co-chairman.

Transportation Committee—Alex Pawlicki, Hygrade Electric Co., Chicago, chairman.

Registration Committee—Glenn Glave, Chicago Electric Co., Chicago, chairman.

Other members of the general convention committee include Jack Lessel, Central Motor & Repair Co., Chicago; and Elmer Jandt, C&H Electric Co., Chicago.

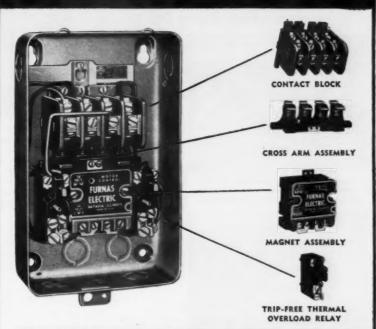
A West Coast Regional Conference of EASA has been called for September 22-23 at Charterhouse Hotel, Anaheim, Calif., opposite Disneyland, it has been announced by H. O. Stump, Stump Electric Co., Los Angeles, president. Discussions will center around shop and office management.

New officers have been named by EASA chapters. Among them—

. . .

Julian Hupp, Electric Motors Co., Cedar Rapids, Iowa, has been elected president of the Midwestern Chapter, along with Curt Flohr, Flohr Electric Co., Omaha, Neb., vice president; Elroy Reese, Reese Electric Co., Ames, Iowa, secretarytreasurer; and Glenn Smith, Elec-

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The bighest quality means the best control! Furnas Electric components, with their "years ahead" design and top quality materials, assure you of top performance and longer control life.

**CONTACT BLOCK**—non-tracking, fungus and moistureresistant. Made of impact-resistant material to withstand severe usage. Deep arc chambers prevent arcing.

CROSS ARM ASSEMBLY—of high-impact material for millions of operations. Stainless steel contact springs. Visible and front removable silver-cadmium oxide contacts.

MAGNET ASSEMBLY—dual voltage—dual frequency coils, 110-220 or 220-440 volts. Magnet features just one moving part. Layer wound encapsulated coil with built-in terminal board. Coils are built to withstand moisture, fungus and combustion.

TRULY TRIP-FREE THERMAL OVERLOAD RELAY—manual or automatic reset. Non-adjustable trip assures tamper-proof operation. Third overload kit can be added in the field.



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While concrete sections were leveled, well-tagged Sno-Melter lead wires were fed into pre-arranged junction boxes.



Electricians were well out of the way by the time top  $1\frac{1}{2}$  layer of concrete was poured. No wonder job went so fastl

Next winter, no more snow to shovel! Pre-assembled electrical Sno-Melters assured a fast, trouble-free job on this walk in front of the new offices of Albert McGann Securities Co., South Bend, Ind. Sno-Melters roll right out as concrete is poured for walks, drives, ramps, docks. Write for engineering data and catalog.

\*Special Sizes

### EASY. HEAT INC.

"Electric Snow Removal Equipment"
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TRAINEES at Still Electric Co., Decatur, Ill., learn to work with conventional shop tools as part of rehabilitation program for the vocationally handicapped, which the shop is conducting for the State of Illinois. More than 20 trainees, who have completed the intensive 75-week course, are now employed in industry throughout the country.

tric Machinery Service, Omaha, Neb., and Henry Peterson, Peterson Electric Motor Service, Mason City, Iowa, directors.

F. E. Cook has been elected president of Southeastern Chapter, along with Michael E. Assalone, vice president; James H. Parrish, secretary-treasurer; Mrs. Nancy S. Waldrop, executive secretary; and W. T. Becton, Roger W. Wilson, Ben F. Whaley, James R. Shearon, J. Lester Belcher and Lewis S. Bain, directors.

The Mid-Year meeting of EASA's Board of Directors will be held in St. Louis at Clayton Inn, November 17-18.

#### **New Books**

ABC's of Computers (Cat. No. ABC-1), by Allan Lytel; 128 pages; \$1.95. Technical Book Div., Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis 6, Ind.

Serves as a basic, self-teaching, introduction to computers in simple language for the technician, maintenance man or beginner. In logical progression, the book discusses circuits, tube and relay switching devices, and other components of both digital and analog computers.

How to Repair Small Appliances (Cat. No. APP-1), by Jack Darr; 128 pages; \$2.50. Technical Book Div., Howard W. Sams & Co., 2201 E. 46th St., Indianapolis 6, Ind.

Discussed and pictured are the operation and repair of such ap-





pliances as toasters, shavers, irons, electric blankets, knife sharpeners, mixers, blenders, coffee makers, popcorn poppers, electric skillets, heating pads, fans, can openers and rotisseries, with chapters on broken or worn line cords, plugs and attachments, and defective heating elements and thermostats.

Tube Substitution Handbook, Vol. 2 (Cat. No. TUB-2); 96 pages; \$1.50. Technical Book Div., Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis 6, Ind.

Up-to-date listing of substitutions possible in electrical equipment employing electronic tubes, including cross-referenced sections of both American and European tubes.

American Standards Publications available from American Standards Assn., 10 E. 40th St., New York 16, N. Y.:

IEC Publication 71: Recommendations for Insulation Coordination (\$3.20)

nation (\$3.20).

IEC Publication 51: Recommendations for Indicating Electrical Measuring Instruments and Their Accessories (\$6.00).

IEC Publication 117-2: Recom-

IEC Publication 117-2: Recommended Graphical Symbols (for machines, transformers, primary cells and batteries) (\$2.40).

C 80.5-1960: American Standard Specifications for Rigid Aluminum Conduit  $(50\phi)$ .

## Films

Meter Testing Made Safe. 16-minute, 35mm sound-slide film in color presents safety practices for use when testing meters where test switches and test blocks are used. \$35 per set. Edison Electric Institute, 750 Third Ave., New York 17, N. Y.

Electric House Heating. 18-minute, full-color sound film, 16mm, illustrates man's progress in bringing warmth into his home, showing consumers that electric heating is today's modern, effective way to obtain winter comfort. \$55 per print, plus postage. Live Better Electrically Program, Edison Electric Institute, 750 Third Ave., New York 17, N. Y.

From a Bed of Pain (Lessons from a Near-Fatal Electric Shock Accident). 15-minute, 35mm sound-slide film in color portrays how and why an accident occurred to a lineman, with a discussion of basic precautions which would have prevented it. \$35 per set. Edison Electric Institute, 750 Third Ave., New York 17, N. Y.

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# DATES AHEAD

5th Electrical World Electric Heating and Heat Pump Conference—Sheraton-Park Hotel, Washington, D. C., September 25-26.

International Association of Electrical Inspectors — Chapter Meetings — George Welman, New Orleans, La., September 26; Southwestern Section, Lafayette Hotel, Long Beach, Calif., September 18-21; Western Section, Biltmore Hotel, Oklahoma City, Okla., September 25-27; Eastern Section, Warwick Hotel, Philadelphia, Pa., October 9-11; Southern Section, Grove Park Inn, Asheville, N. C., October 16-18, Western New York, Buffalo, N. Y., October 25; North Central Div., Texas, Fort Worth, Texas, November 3; Nebraska, Grand Island, Neb., November 6-7; Southern California, Glendale, Calif., November 8; Canadian Section, King Edward Hotel, Toronto, Ont. November 17-18. Illinois, Morrison Hotel, Chicago, Ill., February 1-2; Joint Five Chapters, Shreveport, La., April 27-28.

American Home Lighting Fixture Month—Sponsored by the American Home Lighting Institute, Chicago, Ill., September 1-30.

Industrial Electronics Symposium— Bradford Hotel, Boston, Mass., September 20-21.

Illuminating Engineering Society—National Technical Conference, Chase Park Plaza Hotel, St. Louis, Mo., September 24-29.

Third Virginia Biennial State-Wide Industrial Exposition—Victory Stadium, Roanoke, Va., September 27-30.

Florida Association of Electrical Contractors—Annual conference, Fort Harrison Hotel, Clearwater, Fla., September 29, 30—October 1.

Lighting Progress Exposition—Sponsored by the Electric League of Southern California, Hollywood Palladium, Los Angeles, Calif., October 2.5.

Delaware Valley Electrical Progress Show—Convention Hall, Philadelphia, Pa., October 3-5.

International Association of Electrical Leagues—25th Annual Conference, President Hotel, Atlantic City, N. J., October 4-6.

Western Building Industries Exposition—Great Western Exhibit Center, Los Angeles, Calif., October 7-10.

17th Annual National Electronics Conference — International Amphitheatre, Chicago, Ill., October 9-11.

National Electrical Contractors Association—Annual convention, Washington, D. C., October 10-14.

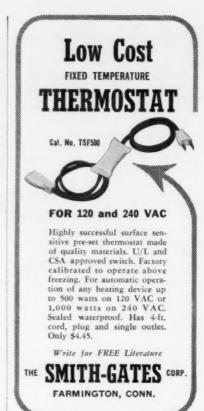
National Electrical Manufacturers Assn.—Annual meeting, Traymore Hotel, Atlantic City, N. J., November 13-17.

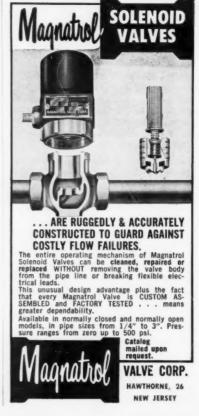
Electrical Engineering Exposition— Sponsored by AIEE, New York Coliseum, New York, N. Y., January 29-February 2, 1962.

National Electrical Week-National promotion, February 11-17.

Sixth National Electrical Industries Show — New York Coliseum, New York, N. Y., March 11-14.

Electrical Apparatus Service Association—Convention, Conrad-Hilton Hotel, Chicago, Ill., June 3-7.





# Among the Manufacturers

# **Headquarters Announcements**

General Electric Co., Schenectady, N. Y.—Ralph J. Cordiner, chairman of the board; Gerald L. Phillippe, president; Cramer W. LaPierre, executive vice president.

Pyramid Instrument Corp., Lynbrook, L. I., N. Y., has changed its name to Amprobe Instrument Corp.

Hysol Corp., Olean, N. Y., and Permacel Div., Johnson & Johnson, New Brunswick, N. J., jointly announce the sale of Permacel's epoxy electrical insulation potting

and encapsulation product line to

Hysol Corp.

Pennsylvania Transformer Div., McGraw-Edison Co., Canonsburg, Pa.—Fred H. Plank, president; succeeding W. E. Kerr, who was named chairman of Pennsylvania-Lectro Management Group; W. R. Swoish, vice president of marketing; and Walter H. Renberg, sales manager.

Federal Pacific Electric Co., Newark, N. J., has opened a manufacturing, warehousing and sales center in Des Plaines, Ill., with Clifford E. Harris as manager.

Multi-Amp Electronic Corp., has moved to its new location at 61 Myrtle St., Cranford, N. J.

Benjamin Div., Thomas Industries, Inc., Des Plaines, Ill.—Harry Shubart, director of manufacturing.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—Charles W. Parker, Jr., general marketing manager, New Products Dept.; Leonard J. Linde, director of engineering, Industries Group; Wayne A. Johnston, board of directors.

American Biltrite Rubber Co., Boston, Mass.—John M. Dennehy, product manager, electrical tape sales, Boston Woven Hose & Rub-

ber Div.

General Electric Co., Tyler, Texas, has announced the formation of a new Product Section, the Central Air Conditioner Section, comprised of G-E's Tyler, Texas, Central Air Conditioner Plant and their Trenton, N. J., Furnace Plant, with W. J. McCullough as general manager.

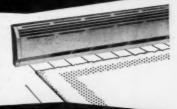
Furnas Electric Co., Batavia, Ill.—James M. O'Rourke, sales

manager.

International Resistance Co., Philadelphia, Pa.—J. Penn Rutherfoord, board of directors.

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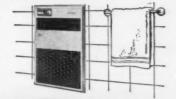
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32 S. PEORIA ST. CHICAGO 7, ILLINOIS Leece-Neville Co., Cleveland, Ohio—Harold J. Zuske, vice president and general manager, Fractional Horsepower Motor Div.; Albert D. Gilchrist, vice president and general manager, Alternator and Standard Products Div.; Robert G. Hill, general sales manager; William E. Carter, sales manager of original equipment; J. S. Allt, manager of all divisions.

Sylvania Electric Products Inc., New York, N. Y.—William F. Rueger, vice president and general counsel

Anderson Electric Corp., Leeds, Ala.—John Q. Dickerson, field engineer.

Union Carbide Corp., New York, N. Y.—R. K. Turner, vice president.

Calcon Mfg. Co., Washington, Pa.—Arthur H. Lassers, general manager.

Worthington Corp., Harrison, N. J.—Draper E. Tessendorf, general manager, Mechanical Power Transmission Div., Oil City, Pa.; William A. Meiter, vice president of Washington, D. C., services.

Appleton Electric Co., Chicago, Ill.—W. P. White, Jr., executive vice president; Robert G. Ehret, director of purchases.

Minnesota Mining & Mfg. Co., St. Paul, Minn.—Dr. C. W. Walton, vice president for research.

Braden Winch, Div. of Nautec Corp., Broken Arrow, Okla.—R. L. Wilson, chief engineer.

Executone, Inc., Long Island City, N. Y.—E. Kenneth Marks, director of manufacturing.

Gould-National Batteries, Inc., St. Paul, Minn.—E. J. Frenzel, manager, utility power applications, Industrial Battery Sales Div.

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.—Raymond S. Fries, manager of manufacturing and engineering, Brown Instruments Div.; Dr. Van W. Berringer, general manager, Semiconductor Div.

E. W. Bliss Co., Canton, Ohio—Carl E. Anderson, president and chief executive officer.

Dytronics, Inc., Rochester, Mich.—Alex W. Warner, vice president and general manager.

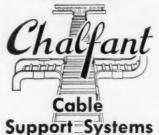
Fairbanks, Morse & Co., Yonkers, N. Y.—Sheldon K. Howard, director of marketing of Beloit (Wis.) group.

Carpenter Steel Co., Reading, Pa.—W. Kent Kise, Jr., manager of electronic alloy sales.

Stackpole Carbon Co., St. Marys, Pa.—Russell T. Dean, chief engineer, Resistor Engineering Dept., Electronic Components Div. You DON'T Need

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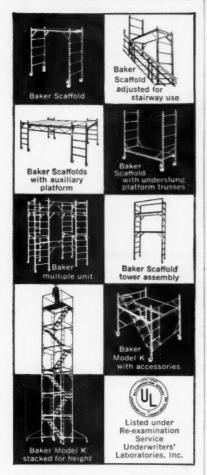
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Steele Mfg. Co., Tyler, Texas— J. Hinds Froussard, general sales manager.

Crouse-Hinds Co., Syracuse, N. Y.—Raymond W. Cummings, vice president of finance.

Fostoria Corp., Fostoria, Ohio— C. A. Williams, manager of engineering; R. E. Justice, manager of manufacturing; Electrical Products Div.

Dayco Corp., Dayton, Ohio—Joseph A. Conlon, vice president of sales, Rubber Products Div.

Bailey Meter Co., Cleveland, Ohio—A. J. Hornfeck, director of research; J. E. McEvoy, manager of Product Engineering Dept.; R. E. Clark, manager of Equipment Engineering Dept.; J. K. Loeser, manager of Project Engineering Dept.; J. V. Werme, manager of Electrical Engineering Dept.

Wheatland Electric Products, Inc., Carnegie, Pa.—Vincent P. Oatis, Jr., marketing manager.

Triangle Conduit & Cable Co., Inc., New Brunswick, N. J.—Harry H. Martin, vice president of operations.

Jerrold Electronics Corp., Philadelphia, Pa.—Sidney Harman, president and chief executive officer; Milton J. Shapp, chairman of the board.

Gedney Electric Co., Inc., New York, N. Y.—Richard W. Noel, vice president of sales; Elmer Quinn, sales manager.

General Electric Co., Niles, Ohio
—A. J. Gizzi, manager of manufacturing and engineering, Chemical
& Metallurgical Div., Conduit
Products Dept.

Pass & Seymour, Inc., Syracuse, N. Y.—T. A. Mager, general sales manager.

# Regional Appointments NEW ENGLAND

Sola Electric Co.: Electrical Agencies, Inc., Boston, Mass., sales representative in the New England

Allis-Chalmers Mfg. Co.: Clinton R. Carlisle, manager of Hartford district; D. R. Silvestrini, manager of industrial sales, Boston district.

Channel Master Corp.: Robert R. Yusen Sales Co., Cambridge, Mass., sales representative; Electrical Div.

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National Supply Div., Armco Steel Corp.: F. W. Emerson Co.,

# VOLTAGE Des



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Fisher-Pierce Div., Sigma Instruments, Inc.: Low Associates, Bristol, Pa., sales representative covering Delaware, eastern Pennsylvania, southern New Jersey and eastern shore of Maryland.

General Tapered Products, Inc.: Jae & Meyer Co., Inc., Mt. Vernon, N. Y. sales and engineering representative; Outdoor Lighting Div.

Detroit Broach & Machine Co.: G. W. Brunton & Son Inc., Buffalo, N. Y., sales representative.

Allis-Chalmers Mfg. Co.: Raymond H. Black, manager of Allentown, Pa., district.

Channel Master Corp.: Clarke & Lype, Inc., Pittsburgh, Pa., sales representative; Electrical Div.

#### SOUTH ATLANTIC

Channel Master Corp.: Hopper & McCoy, Atlanta, Ga., sales representative; Electrical Div.

Allis-Chalmers Mfg. Co.: Joseph Bronaugh, manager, utility sales, Baltimore district; Andrew Wassel, manager, utility sales and W. W. Chalmers, industrial sales, Charlotte district.

H. K. Porter Co., Inc.: R. W. Dixon, manager of new plant at Lynchburg, Va., Delta-Star Electric Div.

Wakefield and Art Metal Lighting Div., Wakefield Corp.: Donald J. Watson, Winter Park, Fla., sales representative, covering northern Florida area.

Oak Mfg. Co.: Cartwright & Beane, Memphis, Atlanta, New Orleans, North Miami Beach and Orlando, sales representative, covering Florida, South Carolina, Georgia, Alabama, Mississippi and Tennessee.

Pringle Electrical Mfg. Co.: O. V. Scott, Jr. and Associates, Atlanta, Ga., representative in Georgia.

#### FAST CENTRAL

Pyle-National Co.: Nicholas P. Roussos, Chicago district manager, Steber Div.

Penn-Union Electric Corp.: John W. Roth Co., Indianapolis, sales agents covering Kentucky, Indiana and southern Illinois.

Owatonna Tool Co.: Thomas F. Devine, district manager for southern Ohio, eastern Kentucky and southwest Virginia, Tools & Equipment Div.

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Johns-Manville Sales Corp.: Thomas H. Kiernan, sales representative for Chicago territory.

General Electric Co.: James Hamlin, sales representative, new sales office in Dayton, Ohio, Silicone Products Dept.; Robert F. Paling, manager of heating control sales, Appliance Control Dept., Morrison, Ill.

Inland Wire Products Co.: Richard H. Shepard, sales manager, Chicago area.

Oak Mfg. Co.: Product Sales Corp., East Lansing, Mich., sales representative.

Channel Master Corp.: D. S. Davis Co., Chicago, Ill., sales representative, Electrical Div.

#### WEST CENTRAL

General Blower Co.: Joseph H. Maloney and Sidney C. Shepard, Jr., sales agents for Louisiana, lower Mississippi and the Florida Gulf Coast areas.

Penn Union Electric Corp.: Bassett-Eischen Co., Omaha and Des Moines, sales agents for Nebraska and Iowa.

General Blower Co.: Rainey Co., Houston, Texas, sales agency.

Accurate Mfg. Co.: Fred C. Baldridge Co., New Orleans, sales representative in Louisiana and Arbaneas

Fanner Mfg. Co.: Henderson Sales Co., Inc., St. Louis, sales representative in the eastern half of Missouri; Electrical Products Div.

Oak Mfg. Co.: Lloyd F. Murphy & Associates, Inc., Minneapolis, sales representative in Minnesota, northern Wisconsin, North and South Dakota.

Channel Master Corp.: Henry L. Guokas Assoc., Dallas, Texas, sales representative, Electrical Div.

### WEST

Eutectic Welding Alloys Corp.: John W. Reuter, division manager in the eleven western states and Alaska and Hawaii, with headquarters in Oakland, Calif.

General Electric Co.: W. L. Batty, Jr., manager of western district and James M. Morrison, sales representative for Western Sales District; Silicone Products Dept., headquarters at Downey, Calif.

Channel Master Corp.: Kenneth Anderson Co., Los Angeles, Calif., sales representative, Electrical Div.



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[FROM PAGE 119]

job and this increases operating costs.

Extended Duration - Cost-Plus contracts, as a rule, run longer than fixed-price contracts of the same volume. This extra duration adds expense, much of which is not shown on the books. For a quick analysis, let's look at some typical cost figures.

Fig. 1 lists certain extendedduration costs for an \$80,000 (including markup) contract of the 60/40 type (base cost: 60% material, 40% labor). Normal duration is five months. Extended duration would involve additional costs shown in the last two columns.

The first item in Fig. 1, for engineering (including field engineering), shows an extended-duration cost of \$24 per month. At present salary levels, one trip to the job would cost that much.

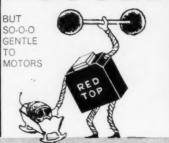
According to "Electrical Estimating" (McGraw-Hill Book Co.), the manpower requirements of an \$80,000 project would be an average of eight and a maximum of 12 men. This would range from 6,000 to 6,300 manhours (at \$4.00 per hour). Tool investment would be around \$2,400.

The estimated time that large



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## ESTIMATING FORUM-XIV

[FROM PAGE 220]

tools can be available for actual use, during their rated life, is 58 months (see EC&M, December, 1956). Using 60 as a round figure, we have \$2,400/60, or \$40 per

In the example in Fig. 1, the extended-duration cost of tools is listed as \$28.80 per month.

Cost of Billing-As we are not trying to establish any exact costs, billing details will not be covered here. However, it is important to emphasize that the expense of billing cost-plus projects must not be regarded lightly. It is doubtful whether many contractors have taken the time to study all of the costs involved.

Such costs can be kept at a minimum by billing a lump sum for so many hours of labor and a lump sum for material with jobbers' invoices attached. Detailed and billing of material items and labor hours can be expensive.

# **Contractor Opinions**

Now comes a logical question: If Fixed-Price contracts are the better, why do contractors prefer Cost-Plus work? Some do not.

There are contractors who prefer a Fixed-Price contract whenever they have a choice. When dealing with regular customers, they usually give an upset price, use lump-sum billing, and give the customer the benefit of any savings that can be effected.

Other contractors feel it is to their advantage to promote and develop, among buyers, the habit of letting Cost-Plus contracts. This idea has merit. Buyers who favor the Cost-Plus arrangement are less likely to subject contractors to cutthroat competition.

Then there is a third group of contractors who, apparently lacking confidence in their estimates and ability to produce, want to play it safe by getting Cost-Plus work.

Fixed-Price contracts are a really fine part of our business. They are fascinating, keep us "on our toes," and make us do our best work. It is the high cost of estimating (getting one out of five jobs) and the cut-throat competition that makes fixed-price projects seem distasteful.



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# PLANNING AN INDUSTRIAL **ELECTRICAL SYSTEM**

[FROM PAGE 99]

Study and actual installation results showed that the third proposal was most economical.

# Installation Techniques

Considerable attention was given to installation methods and specially designed erection equipment. resulting in the following:

1. Use of modified roller hangers, complete with airplane messenger wire for side-tension control. Welded studs were used for securing roller hangers at 5-ft intervals.

2. Installation of roller hangers with a truck-mounted boom operated by pushbutton control. Two men can install a 510-ft roll of roller hangers and supports in 11 hours.

3. Use of a pushbutton-controlled chain-operated conveyor type of hoist located at the center of the

4. Use of index cards, to instruct the ground force for assembly of the whole system at ground level.

5. Preparation of fixtures, busways and boxes at ground level.

Our field supervisors closely followed these procedures, as shown in accompanying photos, and coordinated the lighting installation schedule with concrete floor work, step by step across the building. In this manner, the plant construction was successfully carried out through the winter and the job was completed ahead of schedule.

Approximately 100 loudspeakers are being installed for interplant paging. Time clocks and program controls are furnished for use with the paging system. Measuring noise levels in the existing plants aided in selecting the paging and program control system.

An ADT system and alarm signals have been installed to provide proper plant protection with minimum maintenance forces.

The construction of this new plant was supervised by the following Stone & Webster personnel: H. N. McCampbell, construction manager and vice president; C. K. Salbach, superintendent of construction; N. B. Cleveland, project engineer; and D. W. Nordbeck, building service engineer. Horacek-Hayden Inc., Rochester, N. Y., were the electrical contractors.

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Easy, fast installation was a prime objective when eleven Square D unit substations went into COBO HALL. The various sections of each substation were completely coordinated at the factory. Reconnection of those sections at the job site required a minimum of time and labor.

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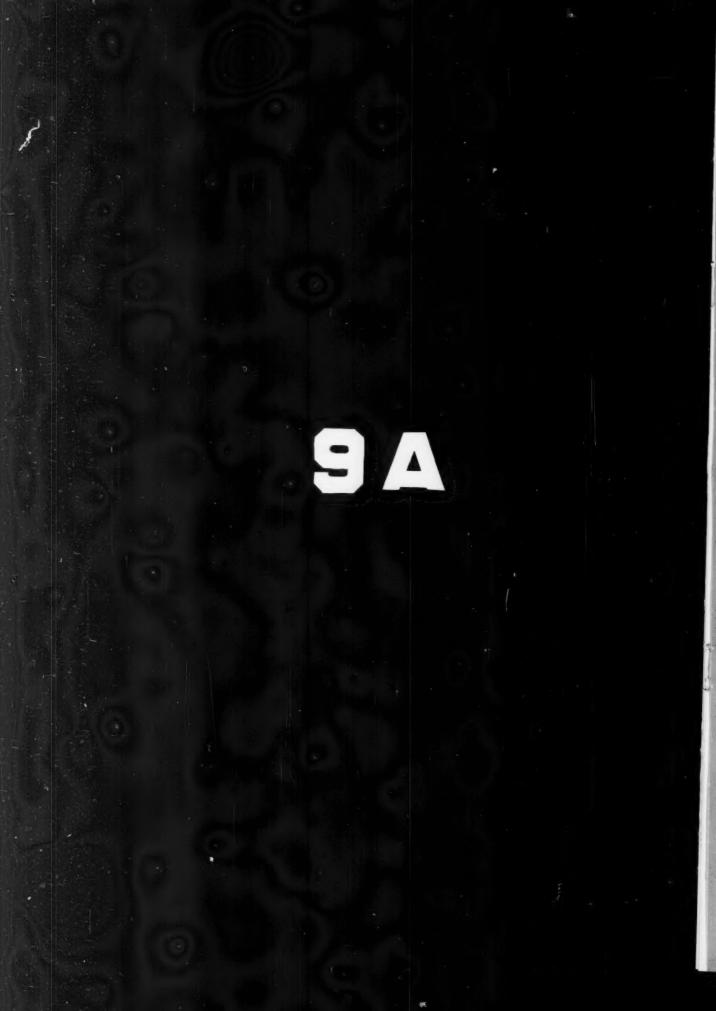
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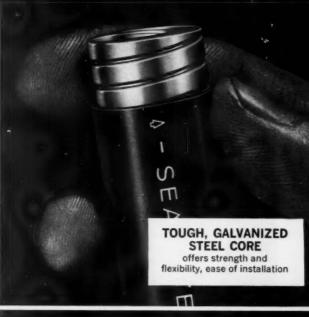
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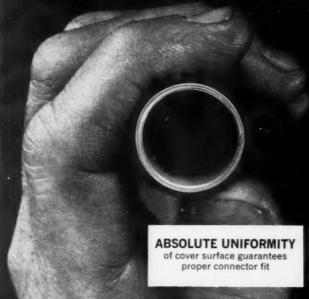
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# It would take more than 100,000 listings to cover all of the electrical items available from Graybar and that's just about everything in the book. So, though we're not listed under every classing, lightenances are we do have what you need for wiring, lightenances are we do have what you need for wiring, communication, ventilation or power distribution. Just consult your near-by Graybar Representative of the list below is only a small sampling of the items on which he can provide complete prices and specifications.

"JUST
ABOUT
EVERYTHING
IN THE
BOOK"

Air Conditioners - unit type

Alarms - fire

Ammeters — panel, pocket, recording

Annunciators — drop, lamp, electric reset

Batteries — wet and dry

BELLS — hazardous location bells, buzzers and

BELLS — hazardous location bells, b horns; also standard types

Blocks — terminal

BOXES — metal outlet and switch

Boxes — all other types

Breakers - oil and air circuit

Bulbs — incandescent
BUS-DUCT

Cabinets - cutout, distribution, fuse

panelboard, transformer

CABLE - rubber-covered

Cable - all other types

Capacitors
Centers — load and distribution

Compounds

Conduit - clay, flexible metallic

CONDUIT - flexible, non-metallic, rigid steel

Connectors — all types

CORD — twisted or parallel

Cord - all other types

Cutoute

DRILLS - portable electric

Duct - power, underfloor

Fans — attic, ventilator, propellor; blowers

FANS - exhaust

Fittings — conduit and cable, all kinds

FIXTURES — commercial and industrial

incandescent

Fixtures - commercial and industrial fluorescent

Fixtures - floodlighting, street lighting

Fixtures - hazardous location, vaportight

FUSES - renewable plug

Fuses — all other types Hangers — conduit, fixture, outlet box

HEATERS - space

Horns - signal

LAMPS - fluorescent tube

Lamps — incandescent

Lamps — all other types

Lugs — solderless
METERS — watt-hour testing

MOTORS - AC single phase

Motors — all other types Outlets — hanger

PANELBOARDS

Plugs — all types

Receptacles — all types

RELAYS — electronic industrial

SIGNALS — nurse and doctor call

Sirens — electric

Sockets — all types

Solenoids - AC, DC, rotary

STARTERS - AC and DC motor

Switchboards

SWITCHES — combined circuit breaker and

starting

Switches — all other types Switchgear — metal-clad

SYSTEMS — intercommunicating

Systems — calling, signaling, public address

TAPE - friction

Tape — all other types

Tools — hand and power, all types

TRANSFORMERS

Tubes - electronic

Ventilators

Voltmeters — panel, pocket, portable

WIRE - rubber-covered

Wire — all other types

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# Electrical Construction and Maintenance with which is consolidated Electrical Confracting. The Electragist and Electrical Record. Established 1901

# ELECTRICAL PRODUCTS GUIDE ISSUE

VOL. 60, NO. 9A

MID-SEPTEMBER, 1961

Alphabetical listing of manufacturers' names, addresses and trade names

manufacturers of each with complete addresses; lists of available product literature and reference material

Product Directory

Index to all editorial material published in Electrical Construction and Maintenance from July, 1960, through June, 1961, inclusive

#### ELECTRICAL CONSTRUCTION and MAINTENANCE

Published monthly with an additional issue in September by McGraw-Hill Publishing Company, Inc. James H. McGraw (1800-1948), Founder, Executive, Editorial, Circulation and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 38, N. Y. Printed in Albany, N. Y. Officers of the Publications Divisions Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director: Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Controller, Officers of the Corporation: Donald C. McGraw, President; Goodriche, Executive Vice President and Controller. Officers of the Corporation: Donald C. McGraw, President; Goodriche, Executive Vice President and Treasurer; John J. Looke, Vice President and Secretary.

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consulting services. The publisher reserves the right to refuse subscription service to others. Position and company connection must be indicated on subscription orders. United States subscription rate for individuals in the field of the publication \$3.00 per year. 75 cents each issue. Electrical Products Guide \$2.50. Canada \$5.00 a year. All other countries, \$15.00 a year, payable in advance. Second class pestage paid at Albany, N. T., and additional mailing offices. Printed in U.S.A. Title registered in U.S. Patent Office. © Copyrighted 1961 by McGraw-Hill Publishing Co., Ins. — All Rights Reserved.

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# WIREMOLD SURFACE METAL RACEWAYS

THE WIREMOLD COMPANY . DEPT. E1-9A, HARTFORD 10, CONNECTICUT

# PLUGMOLD® Multi-Outlet Systems

Cover a wide range of electrical outlet requirements — for new construction or rewiring jobs. Mount on any surface . . . walls, work benches, counters, displays, etc. A minimum of fittings is required.





Furnished three ways: unwired (space outlets as desired); factory-wired sections (for short runs); and prewired Snapicoil (outlets on various centers).





One size raceway accepts five types of outlets — 2-and 3-wire duplex, grounding (A.S.A. Standard) 2-and 3-wire single-circuit, and 3-wire two-circuit.





Furnished unwired (space outlets as desired). Receptacles available include 2-wire, 2- and 3-wire grounding, lumiline single, midget twistlock, 3-wire polarized, 3-wire polarized grounding, and T-slot.





A combination multi-autlet system, wiring raceway and steel baseboard. Same receptacles as No. 2000. Furnished as pre-wired Snapicoil (same as No. 2000).



Any standard device designed for a single gang box can be installed wherever needed within the raceway. Standard flush plates are used.

CAPACITY (for wire types T. TW. RU)

PLUGMOLD		NO.		NO.	NO.	NO 14
NO. 1900	with devices no devices	=	=	Ξ	3	3
NO. 2000	with devices no devices	=	=	=	3	3
NO. 2100	with devices: c no devices	onsult W	iremole 8	Catalo 10	g No. 2	2 17
NO. 2200	with devices no devices	3 5	7 8	10 10	10 10	10
NO. 3000	with devices	10	10	10	10	10

# WIREMOLD® Surface Wiring Raceways



Used along ceilings and walls — to modernize existing wiring, or complete new wiring from panel box to outlets. A minimum of fittings is needed. Four sizes; furnished as onepiece raceways.

NO.200





NO.1000

CAPACITY (for wire types T, TW, RU)

WIREMOLD	NO. 6	NO. 8	NO. 10	NO. 12	NO. 14
NO. 200	-	-	-	3	3
NO. 500	-	2	3	4	5
NO. 700	-	3	5	6	8
NO. 1000	5	8	8	10	10

# PANCAKE® Overfloor Duct Systems

Strong, flat overfloor raceways to carry power and light and communications wiring to locations away from walls. Quickly installed without channeling into floors. A minimum of fittings is needed.

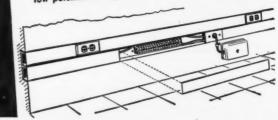


CAPACITY (for wire types T, TW, RU)

PANCAKE	NO. 6	NO. 8	NO. 10	NO. 12	NO. 14
NO. 1500	-	4	4	6	8
NO. 2600	4	7	8	10	10

# **TELE-POWER Duct Systems**

Consist of a pair of parallel Plugmold Raceways — one for telephone, signal and inter-office communications wiring; the other a multi-outlet system for power and light wiring. Because each raceway has a separate cover, the electrical contractor or telephone installer needs only install or remove the cover for the wiring that concerns him. The high and low potential wiring are not exposed to each other.





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# GRAPHICAL SYMBOLS FOR ARCHITECTURAL PLANS

6 2: W 11	CENTERAL OUTS PRÉ	DANIEL CURCIUMS AND MICCELLANDON
Ceiling Wall	GENERAL OUTLETS	PANELS, CIRCUITS, AND MISCELLANEOUS  Lighting Panel
0-0	Outlet	Power Panel
® -®	Blanked Outlet	
0	Drop Cord	Branch Circuit; Concealed in Ceiling or Wall
E -E	Electric Outlet; for use only when circle used alone might be confused with columns, plumbing symbols, etc	Branch Circuit; Concealed in Floor Branch Circuit; Exposed
0	Fan Outlet	Home Run to Panel Board. Indicate number of circuits by number of arrows.
0	Junction Box	Note: Any circuit without further designation indi-
0 -0	Lamp Holder	cates a two-wire circuit. For a greater number of wires indicate as follows: -#//- (3 wires)
0 -0	Lamp Holder with Pull Switch	##- (4 wires), etc.
(S) -(S)	Pull Switch	Feeders. Note: Use heavy lines and designate by num-
	Outlet for Vapor Discharge Lamp Exit Light Outlet	ber corresponding to listing in Feeder Schedule.  Underfloor Duct and Junction Box. Triple System.  Note: For double or single systems eliminate one or
© -©	Clock Outlet (Specify Voltage)	two lines. This symbol is equally adaptable to auxili-
	CONVENIENCE OUTLETS	ary system layouts.  © Generator
-	Duplex Convenience Outlet	Motor
<b>⊕</b> ,₃	Convenience Outlet other than Duplex 1=Single, 3=Triplex, etc	① Instrument
	Weatherproof Convenience Outlet	D Power Transformer (Or draw to scale.)
₩ <sub>P</sub>	Range Outlet	Controller
<b>₽</b> R	Switch and Convenience Outlet	Isolating Switch
<b>⊕</b> s	Radio and Convenience Outlet	AUXILIARY SYSTEMS
<b>→</b> ®	Special Purpose Outlet (Des. in Spec.)	Pushbutton
<b>(A)</b>	Floor Outlet	□ Buzzer
•	SWITCH OUTLETS	Bell
S	Single Pole Switch	- Annunciator
Sz	Double Pole Switch	Outside Telephone
S <sub>3</sub>	Three Way Switch	☐ Interconnecting Telephone
S <sub>4</sub>	Four Way Switch	Telephone Switchboard
So	Automatic Door Switch	Bell-Ringing Transformer
SE	Electrolier Switch	D Electric Door Opener
SK	Key Operated Switch	Fo Fire Alarm Bell
Sp	Switch and Pilot Lamp	F Fire Alarm Station
Sca	C.rcuit Breaker	City Fire Alarm Station
SwcB	Weatherproof Circuit Breaker	FA Fire Alarm Central Station
SMC	Momentary Contact Switch	FS Automatic Fire Alarm Device
SRC	Remote Control Switch	Watchman's Station
SWP	Weatherproof Switch	Watchman's Central Station
SF	Fused Switch	H Horn
SWF	Weatherproof Fused Switch	N Nurse's Signal Plug
	SPECIAL OUTLETS	Maid's Signal Plug
Oa,b,c,etc	Any standard symbol as given above with the addition of a lower case subscript letter may	R Radio Outlet
= a,b,c,etc	be used to designate some special variation of	Signal Central Station
Sa,b,c,etc	standard equipment of particular interest in a specific set of architectural plans.	Interconnection Box
	When used they must be listed in the Key of	վիիիվ Battery
	Symbols on each drawing and if necessary fur- ther described in the specifications.	Auxiliary System Circuits  Note: Any line without further designation indicates a 2-wire system. For a greater number of wires designate with numerals in manner similar to 12-No. 18W-3/4"C., or designate by number corres- ponding to listing in Schedule.
		a,b,c Special Auxiliary Outlets. Subscript letters refer to notes on plans or detailed
		description in specifications.

# GRAPHICAL SYMBOLS FOR POWER AND CONTROL

# **ARRESTERS**



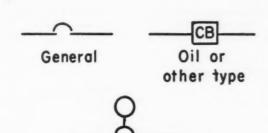
General Carbon block



Electrolyfic

# BATTERIES

# CIRCUIT BREAKERS



Motor-operated

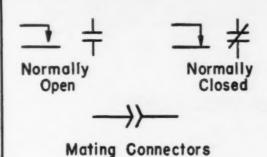
# CAPACITORS



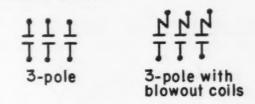
# COILS



# CONTACTS



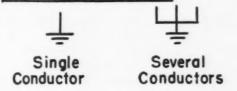
# CONTACTORS



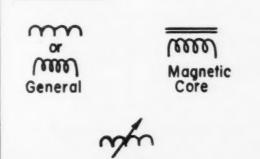
# **FUSES**



# GROUND CONNECTION



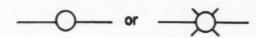
# INDUCTORS



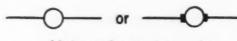
# GRAPHICAL SYMBOLS FOR POWER AND CONTROL

(continued)

# LAMPS

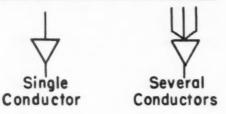


# MACHINES, ROTATING



Motors, Generators, etc.

# POTHEADS (Cable Terminators)

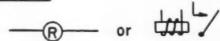


# RECTIFIERS

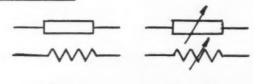


Half Wave Full Wave (Bridge)

# RELAYS



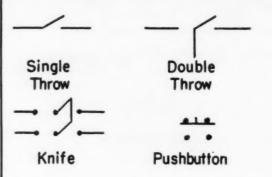
# RESISTORS



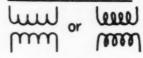
Fixed

Variable

# SWITCHES



# **TRANSFORMERS**

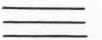


General



With Core

# WIRING



Conductors



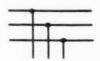
Spliced Conductors



Crossing of conductors, not connected



Crossing of conductors, connected



Joining of conductors, not crossing



Grouping of conductors

Table 1. Maximum Number of Conductors in Conduit or Tubing

Types RF-2, RFH-2, R, RH, RW, RH-RW, RHW, RHH, RU, RUH, RUW, SF and SFF Types TF, T, TW and THW

Size AWG or	(Bo	sed u	pon!	% con	ducto 1½	r fill 2	, Tab 2½	3,0	3½	, for	new v	vork)
MCM 18	In.	In. 12	In. 20	In. 35	In. 49	In. 80	In.	In.	ln.	ln.	ln.	In.
16 14 12 10	6 4 3 1	10 6 5 4	17 10 8 7	30 18 15 13	41 25 21 17	68 41 34 29	98 58 50 41	150 90 76 64	121 103 86	155 132 110	208 173	
8 6 4 3 2 1	1	3 1 1 1 1 1 1	3 1 1 1 1 1	7 4 3 3 3 1	10 6 5 4 3	17 10 8 7 6 4	25 15 12 10 9 7	38 23 18 16 14 10	52 32 24 21 19 14	67 41 31 28 24 18	105 64 49 44 38 29	152 93 72 63 55 42
00 000 0000			1	1 1 1	1 1 1	3 3 2	6 5 4 3	9 8 7 6	12 11 9 8	16 14 12 10	25 22 19 16	37 32 27 23
250 300 350 400 500				1	1 1 1 1	1 1 1	3 1 1 1 1	5 4 3 3 3	5 5 4 4	8 7 6 6 5	13 11 10 9 8	19 16 15 13
600 700 750 800 900						1 1 1 1 1 1	1 1 1 1 1 1	1 1 1	3 3 2 1	4 3 3 3 3	6 5 5 4	9 8 8 7 7
1000 1250 1500 1750 2000						1	1	1 1 1 1 1 1	1 1 1 1 1	3 1 1 1 1 1	4 3 3 2	6 5 4 4 3

# Table 3: Combination of Conductors

For groups or combinations of conductors not included in Table 1, it is recommended that the conduit or tubing be of such size that the sum of the cross-sectional areas of the individual conductors will not be more than the percentage of the interior cross-sectional area of the conduit or tubing shown in the following table:

Per Cent Area of Conduit or Tubing

	Nu	mber	of Co	nduct	018
	1	2	3	4	Over
Conductors (not lead covered)	53	31	43	40	40
Lead-covered conductors For rewiring existing raceways for increased load where it is impracricable to increase the size of the raceway due to	55	30	40	38	35
structural conditions	60	40	50	50	50

See Note to Table 5 for size of conduit or tubing for combinations of conductors not shown in Table 1.

Full Load Currents (Amperes)

HP	115V	230V	550V
14	3. 3.8 5.4 7.4	1.5 1.9 2.7 3.7	1.6
1	9.6	4.8	2.0
1½	13.2	6.6	2.7
2	17	8.5	3.6
3	25	12.5	5.2
5	40	20	8.3
7½	58	29	12
10	76	38	16
15	112	56	23
20	148	74	31
25	184	92	38
30	220	110	46
40	292	146	61
50	360	180	75
60	430	215	90
75	536	268	111
100		355	148
125		443	184
150		534	220
200		712	295

These values of full-load currents are for motors running at usual speed.

Table 430-148: 1-Phase AC Motors

HP	115V	230V	440V
3/4	4.4	2.2 2.9 3.6	**
1/4	4.4 5.8	2.9	
3/6	7.2	3.6	
1/2	9.8	4.9	**
%	13.8	6.9	**
1	16	8	**
11/2	20	10	
2	24	12	**
3	34	17	**
5	56	28	
71/2	56 80	40 50	21
10	100	50	26

These values of full-load currents are far motors running at usual appeals and motors with normal torque characteristics. Motors built far especially low speeds or high torques may have higher full-load currents, in which case the nameplate current retings should be used. To obtain full-load currents of 208 and 200-volt motors, increase corresponding 230-volt motor full-load currents by 10 and 15 per cent, respectively.

Table 430-150: 3-Phase AC Motors

	Squii	rrel-Cag	etion T and W mperes	found F	loter		nchronity Pov	ver Fac	
HP	110V	220V	440V	550V	2300 V	220V	440V	550V	2300 V
1/2 Ni	4 5.6 7	2 2.8 3.5	1 1.4 1.8	.8 1.1 1.4					
11/2	10	5 6.5 9	2.5 3.3 4.5	2.0 2.6 4					
5 7½ 10		15 22 27	7.5 11 14	6 9 11					
15 20 25		40 52 64	20 26 32	16 21 26	7	54	27	22	5.4
30 40 50		78 104 125	39 52 63	31 41 50	8.5 10.5 13	65 86 108	33 43 54	26 35 44	6.5 8 10
60 75 100		150 185 246	75 93 123	60 74 98	16 19 25	128 161 211	81 106	51 65 85	12 15 20
125 150 200		310 360 480	155 180 240	124 144 192	31 37 48	264	132 158 210	106 127 168	25 30 40

For full-load currents of 208 and 200-volt maters, increase the corresponding 220-volt mater full-load current by 6 and 10 per cent, respectively. These values of full-load current are for maters running at speeds usual for belted maters and maters with normal torque cherectristics. Maters built for especially low apseds or high torques may require more running current, in which case the nameplate current rating should be used. For 90 and 80 per cent P.F. the above figures should be multiplied by 1.1 and 1.25 respectively.

Table 4 – Dimensions and Per Cent Area of Conduit and of Tubing

Areas of Conduit or Tubing for the Combinations of Wires Permitted in Table 3

						Area - Squa	are Inches				
	Internal			Not Lea	d Covered			Le	ad Covere	d	
Trade Size	Diameter Inches	Total 100%	1 Cond. 53%	2 Cond. 31%	3 Cond.	4 Cond. and Over 40%	1 Cond. 55%	2 Cond. 30%	3 Cond. 40%	4 Cond. 38%	Over 4 Cond. 35%
1/2 3/4	.622	.30	.16	.09	.13	.12	.17	.09	.12	.11	.11
34	.824	.53	.28	.16	.23	.21	.29	.16	.21	.20	.19
1	1.049	.86	.46	.27	.37	.34	.47	.26	.34	.33	.30
11/4	1.380	1,50	.80	.47-	.65	.60	.83	.45	.60	.57	.53
11/2	1.610	2.04	1.08	.63	.88	.82	1,12	.61	.82	.78	.71
2	2.067	3.36	1.78	1.04	1,44	1,34	1.85	1.01.	1,34	1,28	1.18
21/2	2,469	4.79	2.54	1,48	2.06	1.92	2.63	1.44	1,92	1.82	1.68
3	3.068	7.38	3.91	2,29	3.17	2.95	4.06	2,21	2.95	2.80	2.58
31/2	3.548	9.90	5.25	3.07	4.26	3.96	5.44	2.97	3.96	3.76	3.47
4	4.026	12,72	6.74	3.94	5.47	5.09	7.00	3.82	5.09	4.83	4.45
5	5.047	20.00	10.60	6.20	8.60	8.00	11.00	6.00	8.00	7.60	7.00
6	6.065	28.89	15.31	8.96	12,42	11.56	15.89	8.67	11.56	10.98	10.11

Table 5 – Dimensions of Rubber-Covered and Thermoplastic-Covered Conductors

Size	Types RF-2, R RHH, RHW, RH		Types TF, T RUH**	
AWG	Approx. Diam.	Approx. Area	Approx. Diam.	Approx. Area
MCM	Inches	Sq. Ins.	Inches	Sq. Ins.
18	.146	.0167	.106 .118	.0088
14 14 12 12 10 8	2/64 in171 3/64 in204* 2/64 in188 3/64 in221* .242 .311	.0230 .0327* .0278 .0384* .0460	.131 .148 .168 .228	.0135 .0172 .0224 .0408
6 4 3 2 1	.397 .452 .481 .513	.1238 .1605 .1817 .2067 .2715	.323 .372 .401 .433 .508	.0819 .1087 .1263 .1473 .2027
0	.629	.3107	.549	.2367
00	.675	.3578	.595	.2781
000	.727	.4151	.647	.3288
0000	.785	.4840	.705	.3904
250	.868	.5917	.788	.4877
300	.933	.6837	.843	.5581
350	.985	.7620	.895	.6291
400	1.032	.8365	.942	.6969
500	1.119	.9834	1.029	.8316
600	1,233	1.1940	1.143	1.0261
700	1,304	1.3355	1.214	1.1575
750	1,339	1.4082	1.249	1.2252
800	1,372	1.4784	1.282	1.2908
900	1,435	1.6173	1.345	1.4208
1000	1.494	1.7531	1.404	1.5482
1250	1.676	2.2062	1.577	1.9532
1500	1.801	2.5475	1.702	2.2748
1750	1.916	2.8895	1.817	2.5930
2000	2.021	3.2079	1.922	2.9013

\*The dimensions of Type RW, RHH and THW wire. Also, these dimensions to be used for new work in computing size of conduit or tubing for combinations of wires not shown in Table 1.

\*\* No. 14 to No. 2.

No. 18 to No. 8, solid; No. 6 and larger, stranded.

The dimensions of rubber-covered conductors in column 3 of this table are to be used in computing the size of conduit or tubing for new work for combinations not shown in Table 1. The dimensions in the last column of this table may be used only for rewiring existing raceways.

Table 6 – Dimensions of Lead-Covered Conductors

Size		ngle luctor	Cond	wo uctor	Three Conductor		
AWG MCM	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.	Diam. Inches	Area Sq. Ins.	
14 12 10 8	.28 .29 .35	.062 .066 .096 .132	.28 x .47 .31 x .54 .35 x .59 .41 x .71	.146	.59 .62 .68 .82	.273 .301 .363 .528	
6 4 2 1	.49 .55 .60	.188 .237 .283 .352	.49 x .86 .54 x .96 .61 x 1.08 .70 x 1.23	.457 .578	.97 1.08 1.21 1.38	.738 .916 1.146 1.49	
0 00 000 0000	.71 .76 .81	.396 .454 .515 .593	.74 x 1.32 .79 x 1.41 .84 x 1.52 .90 x 1.64	.980 1,123	1.47 1.57 1.69 1.85	1.70 1.94 2.24 2.68	
250 300 350 400 500	.98 1.04 1.10 1.14 1.23	.754 .85 .95 1.02 1.18			2.02 2.15 2.26 2.40 2.59	3.20 3.62 4.02 4.52 5.28	

Note — No. 14 to No. 8, solid conductors; No. 6 and larger, stranded conductors. Data for 2/64-inch insulation not yet compiled.

# Varnished-Cambric Insulated Conductors

Type V

The insulation thickness for varnished-cambric conductors, Type V, is the same as for rubber-covered conductors, Type R, except for Nos. 14 and 12 which have 3/64-inch insulation for varnished-cambric, and 2/64-inch insulation for rubber-covered conductors and for No. 8 which has 3/64-inch insulation for varnished-cambric, and 4/64-inch insulation for rubber-covered conductors. Tables 1 and 2 may, therefore, be used for the number of varnished-cambric insulated conductors in a conduit or tubing.

Note: The above tables give the nominal size of conductors and conduit or tubing recommended for use in computing size of conduit or tubing for various combinations of conductors. The dimensions represent average conditions only, and while variations will be found in dimensions of conductors and conduits of different manufacture, these variations will not affect the computation.

Table 430-152. Maximum Rating or Setting of Motor-Branch-Circuit Protective Devices for Motors Marked with a Code Letter Indicating Locked Rotor KVA

Letter indicating	Locked Kotor K	-	
	Per Cent of	Full-Load	Current
		Circuit-Bre	aker Setting
Type of Motor	See also Table 430-146, Columns 4, 5, 6, 7)	Instan- taneous Type	Time Limit Type
All AC single-phase and polyphase squirrel cage and synchronous motors with full-voltage, resistor or reactor starting: Code Letter A Code Letter B to E Code Letter Fto Y	150 250 300	*****	150 200 250
All AC squirrel cage and synchronous motors with auto- transformer start- ing: Code Letter A Code Letter B to E Code Letter F to V	150 200 250	0005+0 0005+0	150 200 200

Synchronous motors of the low-torque, low-speed type (usually 450 RPM or lower), such as are used to drive reciprocating compressors, pumps, etc., which start up unloaded. do not require a fuse rating or circuit-breaker settingin excess of 200 percent of full-load current.

Table 430-153. Maximum Rating or Setting of Motor-Branch-Circuit Protective Devices for Motors not Marked with a Code Letter Indicating Locked Rotor KVA

	Per Cent of	Full-Load C	urrent
	Fuse Rating	Circuit-Bre	aker Setting
Type of Motor	(See also Table 430-146, Columns 4, 5, 6, 7	Instan- taneous Type	Time Limit Type
l-phase, all types	300	*****	250
Squirrel-cage and synchronous (full- voltage, resistor and reactor start- ing)	300	424043	250
Squirrel-cage and synchronous (auto- transformer start- ing) Not more than 30 amperes	250		200
More than 30 am-	200		200
High - reactance squirrel-cage Not more than 30 am-	250	050199	250
More than 30 amperes	200	*****	200
Wound-rotor	150	*****	150
Not more than 50	150	250	150
More than 50 H.P.	150	175	150

Code	Code Kilovolt-Amperes per Horsepower					
Letter		ocked Rotor				
A	0	- 3.14				
В	3.15	- 3.54				
C	3.55	- 3.99				
CDEFG	4.0	- 4.49				
E	4.5	- 4.99				
F	5.0	5.59				
G	5.6	- 6.29				
H	6.3	- 7.09				
J	7.1	- 7.99				
K	8.0	- 8.99				
L	9.0	- 9.99				
M	10.0	11.19				
N P	11.2	- 12.49				
P	12.5	- 13.99				
R	14.0	- 15.99				
R	16.0	— 17.99				
T	18.0	- 19.99				
U	20.0	- 22.39				
V	22 4	- and up				

The above table is an adopted standard of the National Electrical

The above table is an adopted standard of the National Electrical Manufacturers Association.

The code letter indicating motor input with locked rotor must be in an individual block on the nameplate, properly designated. This code letter is to be used for determining branch circuit overcurrent protection by reference to Table 430-152.

# Table 710-37: Isolation by Elevation

Distance of Live Parts Above the Floor or Other Working Surface

	Minimum Vertical Clearance of Unguarded Parts		
Voltage Between Phases	Feet	Inches	
601	8	0	
2300	8	0	
6600	8	0	
11000	9	0	
22000	9	3	
33000	9	6	
44000	.9	10	
66000	10	5	
88000	ii	0	
110000	11	7	
132000	12	2	

# Table 710-38: Working Space

Minimum Clear Space Adjacent to Live Parts

	of Ungua	rded Parts	
Voltage Between Phases	Feet	Inches	
601	3	2	
2300	3	3	
6600	3	4	
11000	3	6	
22000	3	9	
33000	4	0	
44000	4	4	
66000	4	11	
88000	5	6	
	6	1	
132000	6	8	
	2300 6600 11000 22000 33000 4400 66000 88000 110000	Voltage Between Phases Feet  601 2300 6600 3 11000 3 22000 3 33000 4 44000 4 66000 4 88000 5 110000 6 6	601 3 2 2 3 3 3 4 5 5 6 6 1 10000 6 6 1

## MAXIMUM NUMBER OF CONDUCTORS IN BOXES

Table 370-6(a-1): Deep Boxes								
Box Dimensions Trade Size		No. 12		uctors No. I				
1 1/2 x 3 1/4 octagonal	5 8 9	5 7 7 9	4 6 6 7	0 5 4 5				
1 1/2 x 4 11/16 square 2 1/8 x 4 11/16 square x 1 3/4 x 2 3/4 2 1/2 x 1 3/4 x 2 3/4	16 20 5	12 16 4	10 12 4	8 10				
3 × 1 3/4 × 2 3/4	7	7	6					

Where there is not sufficient space for a deeper box, four No. 14 AWG conductors may enter a box provided with cable clamps and containing one or more devices on a single mounting strap.

# Table 370-6(a-2): Shallow Boxes (Less than 11/2" Depth)

Box Dimensions Trade Size	Maximum No. 14	Number of Con No. 12	ductors No. 10
3 1/4	4	4	3
4	6	6	4
4 11/16	8	6	6

The above tables apply where no fittings or devices, such as fixture studs, cable clamps, hickeys, switches or receptacles are contained in the box. Where one or more fixture studs, cable clamps, or hickeys are contained in the box, the number of conductors shall be one less than shown in the tables with a further the number of conductors shall be one less than shown in the tables with a further deduction of one conductor for one or several flush devices mounted on the same strap. A conductor running through the box is counted as one conductor and each conductor originating outside the box and terminating inside the box is counted as one conductor. Conductors of which no part leaves the box are not to be counted in the above computation. If single flush boxes are ganged, and each section is occupied by a flush device or combination of flush devices on the same strap, the limitations will apply to each section individually.

# Table 370-6(b): Other Combinations

Size of	Free Space Within Box
Conductor	for Each Conductor
No. 14	2. cubic inches
No. 12	2.25 cubic inches
No. 10	2.5 cubic inches
No. 8	<ol><li>cubic inches</li></ol>

# PROTECTIVE DEVICES FOR RUNNING OVERLOAD PROTECTION AND BRANCH CIRCUIT PROTECTION

(Based on Rated Full-load Mater Current)
Table 430-146

ol. No. 1 2 3 4 5 4 7												
ot, No. 1  Full load current rating of	For Running Protection of Motors  Maximum Maximum rating setting of non-		WITH COI Single-pi cage and Full volt or react Code le	Maxin DE LETTERS thase squirrel synchronous. lage, resistor for starting, tters F to V lusive.	WITH COD Single-pha cage and s Full volta or reactor letters B to Auto trans Code letters	E LETTERS se, squirrel yorktonous, ge, resistor start, Code E inclusive, lormer start, to V inclusive.	of Branch Circ WITH COD Squirre synchro transfoi Code let incl	uit Protective Dev E LETTERS i cage and nous auto mer start, ters B to E usive.	vices WITH COD Ali mo let	E LETTERS lors code ler A.		
metar amperes	protective protective		at biotective biotective			ODE LETTERS as above.	(Not more that Squirrel ca chronous, as start, high	DE LETTERS in 30 Amperes) ge and syn- ito transformer i reactance el cage.	(More than Squirrel co chronous, a start, hig	DDE LETTERS 30 Amperes) age and syn- uto transformer h reactance el cage.	DC and	DDE LETTER wound reter tors.
	Amperes	Amperes	Fuses	Circuit Breakers (Non- adjustable Overload Trip)	Fuses	Circuit Breakers (Mon- adjustable Overload Trip)	Fuses	Circuit Breakers (Non- adjustable Overload Trip)	Fuses	Circuit Breakers (Non- adjustabl Overload Trip)		
1 2	2 3	1.25	15 15	15 15	15 15	15 15	15 15	15 15	15 15	15 15		
3 4	4	3.75 5.0	15 15	15 15	15 15 15	15 15 15	15 15	15 15 15	15 15	15 15 15		
6	8	6.25 7.50 8.75	15 20 25	15 15 20	15 15 20	15 15 15	15 16 15	15 15 15	15 15 15	15 15 15		
8	10	10.0	25	20 30	20	20	20	20	15	15		
10 11	15 15	12.50 13.75	30 35	30 30	25 30	20 30	20 25	20 30	15 20	15 20		
13	20	15.00 16.25	40	30 40 40	30 35 35	30 30 30	25 30 30	30 30 30	20 20 25	20 20 30		
14 15	20 20 20	17.50 18.75 20.00	45 45 50	40	40 40	30 40	30	30 40	25	30		
16 17 18	20 25 25	20.00 21.25 22.50	50 60 60	40 50 50	45 45	40 40	35 35 40	40	25 30 30	30 30 30		
19 20 22	25 25 30	23.75 25.00	60 60 70	50 50 70	50 50	40 40 50	40 40 45	40	30	30 30 40		
24	30 30 35	27.50 30.00 32.50	80 80	70 70 70	60 70	50 50 70	50	50 50 70	35 40 40	40 40		
26 28 30	35 40	35.00 37.50	90	70	70	70	60	70	45	50 50		
32 34	40 45	40.00	100	100 100	80	70 70	70	70 70	50 60	50 70		
36	45 50	45.00 47.50	110 125	100	100	100 100 100	80 80 80	100 100 100	60 60	70 70 70		
40 42 44	50 50	50.00 52.50	125 125 125	100 125 125	100 110	100 100	30	100	70	70 70		
46 48	60 60	55.00 57.50 60.00	125 150 150	125 125 125	110 125 125	100	100	100 100 100	70 70 80	70 100		
50 52 54	60 70	62.50 65.00 67.50	150 175	125 150	125 150 150	100 125 125	100	100 125	80	100 100 100		
54 56 58	70 70 70	70.00 72.50	175 175 175	150 150 150	150 150 150	125 125 125	110 125 125	125 125 125	90 90 90	100		
60	80	75.00 77.50	200	150 175	150 175	125 125	125	125 125	90	100		
64 65	80	80.00	200	175 175	175 175	150 150	150 150	150 150	100	100		
70	90	85.00 87.50	225	175 175	175 175	150 150	150 150	150 150 150	110 110 110	125 125 125		
72 74	90	90.00 92.50 95.00	225 225 250	200 200 200	200 200 200	150 150 175	150 150 175	150	125	125		
76 78 80	100 100 100	95.00 97.50 100.00	250 250 250	200 200 200	200	175 175 175	175 175 175	175 175 175	125 125 125	125 125 125		
82 81 86	116 110 110	102.50 105.00 107.50	250 250 300	225 225 225	225 225 225	175 175 175	175 175 175	175 175 175	125 150	125 150		
88	110	110.00	300 300 300	225 225 225	225 225 225	175 200 200	175 200 200	1 75 200 200	150 150 150	150 150 150		
90 92 94	110 125 125	112.50 115.00 117.50	300 300	250 250	250 250	200 200	200	200	150 150	150 150		
96 98	125 125	120.00	300	250 250	250 250	200	200	200	150 150	150 150		
100	125	125.00 131.50	300 350 350	250 300 300	250 300 300	200 225 225	200 225 225	200 225 225	150 175 175	150 175 175		
110 115 120	150 150 150	137.50 144.00 150.00	350 350 400	300 300 300	300 300 300	250	250	250	175	175		
120 125 130	150 175 175	156.50 162.50	400	350 350	350 350	250 250 300	250 250 300	250 250 300	200 200 200	200 200 200		
135 140 145	175 175 200	169.00 175.00 181.50	450 450 450	350 350 400	350 350	300 300 300	300 300 300	300 300	225 225 225	225 225 225		
145 150 155	200 200 200	187.50 184.00	450 450 500	400 400 400	400 400 400	300 300 350	300 350	300 300 350	225 250	225 250		
160 165	200	200.00	500	400 500	400 450	350 350	350 350	350 350 350	250 250 300	250 250		
170 175	225	213.00	500	500 500	450 450	350 350	350 350	350	300	300 300		
180	225	225.00 231.00	600	500 500	450 500	400 400 400	400 400 400	400 400 400	300 300 300	300 300 300		
190 195 200	250 250 250	238.00 244.00 250.00	600 600	500 500 500	500 500 500	400 400 400	400 400 400	400 400 400	300	300 300		
200 210 220	250 250 300	263.00 275.00	800	600 600	600	500 500	450 450	500 500	300 350 350	350 350		
230 240 250	300 380 300	288.00 300.00 313.00	800 800 800	600 600	600 600 800	500 500 500	500 500 500	500 500	350 400 400	350 400 400		
250 260 270	300 359 350	313.00 325.00 338.00	800 800 1000	700 700 700	800 800 800	600 600	600 600	500 600 600	400 400 450	400 400 500		

# ALLOWABLE CURRENT-CARRYING CAPACITIES OF INSULATED CONDUCTORS (Amperes) Not More Then Three Conductors in Receway or Cable or Direct Buriel (Based on Room Temperature of 30C, 86F)

		TABLE 3	10-12: COP	PER					TABLE 310	14: ALUMIN	IUM		
Size AWG MCM	Rubber Type R Type RW Type RU Type RUW (14-2) Type RH-RW* Thermo- plastic Type T	Rubber Type RH RUH (14-2) Type RH-RW* Type RHW Thermo- plastic	Paper Thermoplastic Asbestos Type TA Var-Com Type V Asbestos Vor-Cam Type AVB MI Cable RHH†	Asbestos Var-Cam Type AVA Type AVL	Impreq- nated Asbestos Type Al (14-8) Type AlA	Asbestos Type A (14-8) Type AA	Size A#G MCM	Rubber Type R, RW, RU, RUW (12-2) Type RH-RW** Thermo- plastic Type T, TW	Rubber Type RH RUH (14-2) Type RH-RW** Type RHW Thermo- plassic Type THW	Thermo- plastic Asbestos Type TA Var-Cam Type V Asbestos Var-Cam Type AVB MI Cable RHH† 5.4	Asbestos Var-Cam Type AVA Type AVL	Impred- nated. Asbestos Type Al (14-8) Type AIA	Asbeste Type A (14-8) Type A/
14	Type TW	Type THW	S.A 25	30	30	30	12 10 8	15 25 30	15 25 40	25 30 40	25 35 45	30 40 50	30 45 55 75
14 12 10	20	20 30	30 40	35 45	40 50	40 55	6	40	50	55	60	65	
6 4	55 70	45 65 85	70 90	80 105	65 85 115	70 95 120	3 *2	55 65 75 85	65 75 90 100	70 80 95 110	80 95 105 125	90 100 115 135	95 115 130 150
3 2 1	80 95 110	100 115 130	105 120 140	120 135 160	130 145 170	145 165 190	*0 *00 *000	100 115 130	120 135 155	125 145 165	150 170 195	160 180 210	180 200 225
00 000 0000	125 145 165 195	150 175 200 230	155 185 210 235	190 215 245 275	200 230 265 310	225 250 285 340	*0000 250 300	155 170 190	180 205 230	185 215 240	215 250 275	245 270 305	270
250 300 350	215 240 260	255 285 310	270 300 325	315 345 390	335 380 420	250-11A A12A-6	350 400 500	210 225 260	250 270 310	260 290 330	310 335 380	335 360 405	*****
400 500 600	280 320 355	335 380 420	360 405 455	420 470 525	450 500		600 700 750	285 310 320	340 375 385	370 395 405	425 455 470	440 485 500	******* ******
700 750 800	385 400 410	460 475 490	490 500 515	560 580 600	600 620 640	551115 551115 535115	800 900 1000	330 355 375	395 425 445	415 455 480	485 560	520 600	*****
900	435	520 545	555	680	730	*****	1250 1500 1750	405 435 455	485 520 545	530 580 615	650	******	\$1500.00 \$1000.00 \$1000.00
1250 1500 1750	495 520	590 625 650	645 700 735	785	*****	2000A	2000	470	560 N FACTORS	650	PS. OVER 3	*****	0.000
2000	545 560	863	775	840	MANUAL MA	Marine .		.82	.88	.90	.94	.95	
C. F.	ORRECTION		ROOM TEMP				45 113 50 122	.71	.82 .75	.85 .80	.90	.92	MARAGE MARAGE MARAGE
40 104 45 113 50 122 55 131	. 82 .71 .58	.88 .82 .75	.90 .85 .80	.94 .90 .87	.95 .92 .89	**************************************	60 140 70 158	.41	.67 .58 .35	.74 .67 .52	.83 .79 .71	.86 .83 .76	91
60 140	.41	.58	.67	.83	.86	.91	75 167 80 176	*****	****	.43	.66 .61	.72 .69	.86 .84
70 158 75 167 80 176	******	.35	.52 .43 .30	.71 .66 .61	.76 .72 .69	.87 .86 .84	90 194 100 212 120 248	Second- tioner	******		.50	.61 .51	.80 .77 .69
90 194 100 212	+	*****	111111	.50	.61 .51	.80	140 284 *For three wir	111111	ELECTE MARKET	1000		******	.59

1 The current-carrying capacities for Type RHH conductors for sizes AWG 14, 12 and 10 all be the same as designated for Type RH conductors in this table.

ing capacity of RH, Rh-RW, Rhh end RHW aluminum conductors shall be for sizes #2-100
Amp., #1-10 Amp., #1-10 Amp. #1-10 Amp. #1-110 Amp.
The current-carrying capacities for Type RHH conductors for sizes AWG 12, 10 and 8 shall
be the same as designated for Type RH conductors in this table.

\*\*See Note Ba.

#### HOTES TO TABLES

4. Bare Conductors. Where bare conductors are used withinsulated conductors, their allowable current-carrying capacity shall be limited to that permitted for the insulated conductors of the same size.

5. Type MI Cable. The temperature limitation on which the current carrying capacities of Type MI cable are based, is determined by the insulating materials used in the end seal. Termination fittings incorporating unimpregnated organic insulating materials are limited to 85° C. operation.

7. Use of Conductors With Higher Operating Temperatures. Where the room temperature is within 10 degrees C of the maximum allowable operating temperature of the insulation, it is desirable to use an insulation with a higher maximum allowable operating temperature; although insulation can be used in a coom temperature approaching its maximum allowable operating temperature limit if the current is reduced in accordance with the Correction Factors for different room temperatures.

8. Mace Than Three Conductors in a Racewey. Tables 310-12 and 310-14

8. More Than Three Conductors in a Raceway. Tables 310-12 and 310-14 give the allowable current-corrying capacities for not more than three conductors in a raceway or cable. Where the number of conductors in a raceway or cable exceeds three, the allowable current-carrying capacity of each con-ductor shall be reduced as shown in the following Table: Number of Per Cent of Conductors Tabular Yelium

Per Cent of Tobuler Values 4 to 6 7 to 24 25 to 42 43 and above

Exception—When conductors of different systems, as provided in Section 300-3, are installed in a common raceway the derating factors shown above apply to the number of Power and Lighting (Articles 210, 220 and 230) constructs enables. ductors only

8. (a) Where Type Rtt-RW rubber insulated wire is used in wet locations the allowable current carrying capacities shall be that of Column 2 in Tables 310-12 through 310-15. Where used in dry locations the allowable current carrying capacities shall be that of Column 3 in Tables 310-12 through 310-15.

9. Overcurrent Protection. Where the standard ratings and settings of overcurrent devices do not correspond with the ratings and settings allowed for conductors, the next higher standard rating and setting may be used.

10. Neutral Cenductor. A neutral conductor which carries only the unbalanced current from other conductors, as in the case of normally balanced circuits of three or more conductors, shall not be counted in determining current-carrying capacities as provided for in Paragraph 8 of these notes.

In a 3-wire circuit consisting of two phase wires and the neutral of a dwire, 3-phase system, a common conductor carries approximately the same current as the other conductors and is not therefore considered as a neutral conductor.

connector.

11. Valtage Drep. The allowable current-carrying copacities in Tables
310-12 through 310-15 are based on temperature alone and do not take voltage drop into consideration.

12. Deterioration of Insulation. It should be noted that even the best grades of rubber insulation will deteriorate in time, so eventually will need to be replaced.

# DC CIRCUIT CHARACTERISTICS

Ohm's Law:

$$E = IR$$
  $I = \frac{E}{R}$   $R = \frac{E}{I}$ 

E = voltage impressed on circuit (volts)

I = current flowing in circuit (amperes)

R = circuit resistance (ohms)

In direct current circuits, electrical power is equal to the product of the voltage and current:

$$P=EI=I^{2}R=\frac{E^{2}}{R}$$

P = power (watts)

E = voltage (volts)

I = current (amperes)

R = resistance (ohms)

### AC CIRCUIT CHARACTERISTICS

The instantaneous values of an alternating current or voltage vary from zero to a maximum value each half cycle. In the practical formulae which follow, the "effective value" of current and voltage is used, defined as follows:

Effective value =  $0.707 \times \text{maximum}$  instantaneous value

#### Impedance

Impedance is the total opposition to the flow of alternating current. It is a function of resistance, capacitive reactance and inductive reactance. The following formulae relate these circuit properties:

$$X_L \! = \! 2\pi f L \qquad X_C \! = \! \frac{1}{2\pi f C} \qquad Z \! = \! \sqrt{R^2 + (X_L - X_C)^3}$$

X<sub>L</sub> = inductive reactance (ohms)

X<sub>c</sub> = capacitive reactance (ohms)

Z = impedance (ohms)

f = frequency (cyles per second)

C = capacitance (farads)

L = inductance (henrys)

R = resistance (ohms)

 $\pi = 3.14$ 

Ohm's Law for AC Circuits:

$$E=1\times Z$$
  $I=\frac{E}{7}$   $Z=\frac{E}{1}$ 

# POWER FACTOR

Power factor of a circuit or system is the ratio of actual power (watts) to apparent power (volt-amperes), and is equal to the cosine of the phase angle of the circuit:

$$PF = \frac{\text{actual power}}{\text{apparent power}} = \frac{\text{watts}}{\text{volts} \times \text{amperes}} = \frac{\text{KW}}{\text{KVA}} = \frac{\text{R}}{\text{Z}}$$

KW = kilowatts

KVA = kilovolt-amperes = volt-amperes × 1,000

PF = power factor (expressed as decimal)

# SINGLE-PHASE CIRCUITS

$$KVA = \frac{EI}{1.600} = \frac{KW}{PF}$$
  $KW = KVA \times PF$ 

$$i = \frac{P}{E \times PF}$$
  $E = \frac{P}{I \times PF}$   $PF = \frac{P}{E \times I}$ 

P = E X I X PE

P = power (watts)

# THREE-PHASE CIRCUITS, BALANCED STAR OR WYE

$$I_{\rm N} = 0$$
  $I = I_{\rm p}$   $E = \sqrt{3} E_{\rm p} = 1.73 E_{\rm p}$ 

$$E_p = \frac{E}{\sqrt{3}} = \frac{E}{1.73} = 0.577E$$

 $I_{\rm N} =$  current in neutral (amperes)

I = line current per phase (amperes)

I, = current in each phase winding (amperes)

E = voltage, phase to phase (volts)

E<sub>p</sub> = voltage, phase to neutral (volts)

# THREE-PHASE CIRCUITS, BALANCED DELTA

$$I=1.732\times I_P \qquad I_0=\frac{1}{\sqrt{3}}=0.577\times I$$

# POWER: BALANCED 3-WIRE, 3-PHASE CIRCUIT, DELTA OR WYE

For unity power factor (PF = 1.0):

$$P = 1.732 \times E \times I$$

$$I = \frac{P}{\sqrt{3}E} = \frac{0.577P}{E} \qquad E = \frac{P}{\sqrt{3} \times I} = \frac{0.577P}{I}$$

P = total power (watts)

For any load:

E = E.

$$P = 1.732 \times E \times I \times PF$$
  $VA = 1.732 \times E \times I$ 

$$E = \frac{P}{PF \times 1.73 \times I} = \frac{0.577 \times P}{PF \times I}$$

$$1 = \frac{P}{PF \times 1.73 \times E} = \frac{0.577 \times P}{PF \times E}$$

$$PF = \frac{P}{1.73 \times I \times E} = \frac{0.577 \times P}{I \times E}$$

VA = apparent power (volt-amperes)

P = actual power (watts)

E = line voltage (volts) phase to phase

I = line current (amperes)

# POWER LOSS: ANY AC OR DC CIRCUIT

$$P=I^{3}R \qquad I=\sqrt{\frac{P}{R}} \qquad R=\frac{P}{I^{3}}$$

P = power heat loss in circuit (watts)

I = effective current in conductor (amperes)

R = conductor resistance (ohms)

kw	hp	kw	hp	kw	hp
1	1.341	30	40.218	130	174.28
2	2.681	32	42.899	140	187.68
3	4.022	34	45.580	150	201.09
4	5.363	36	48.261	160	214.50
5	6.703	38	50.943	170	227.90
6	8.044	40	53.624	180	241.31
7	9.384	42	56.305	190	254.71
8	10.725	44	58.986	200	268.12
9	12.065	46	61,667	220	294.93
10	13.406	48	64.349	240	321.74
11	14.747	50	67.030	260	348.56
12	16.087	55	73.733	280	375.37
13	17.428	60	80,436	300	402.18
15	17.768	65	87,139	325	435.69
16	21.450	70	93.842	350	469.21
17	22,790	75	100.545	400	436.24
18	24.131	80	107.248	450	603.27
19	25.471	85	113.951	500	670.30
20	26.812	90	120.654	600	304.36
22	29,493	95	127.357	700	938.42
24	32,174	100	134.048	800	1072.48
26	34.856	110	147.47	900	1206.54
28	37.537	120	140.87	1000	1340.60

hp	kw	hp	kw	hp	kw
1	.746	30	22,380	130	96.91
2	1.492	32	23.872	140	104.44
3	2.238	34	25.364	150	111.90
4	2.984	36	26.856	160	119.34
5	3.730	38	28.348	170	126.83
6	4.476	40	29.840	180	134.21
7	5.222	42	21.332	190	141.74
8	5.968	44	32,824	200	149.20
9	6.714	46	34,316	220	164.12
10	7.460	48	35,808	240	179.0
11	8.206	50	37,300	260	193.9
12	8.952	55	41.03	280	208.8
13	9.698	60	44.76	300	223.8
14	10.444	65	48.49	325	242.4
15	11.190	70	52.22	350	261.1
17	12.682	75	55.95	400	298.4
18	13.428	80	59.68	450	335.7
19	14,174	85	63.41	500	373.0
20	14.920	90	67.14	400	447.6
22	16.412	95	70.87	700	522.2
24	17,904	100	74.60	800	596.8
26	19.396	110	82.06	900	671.4
28	20.888	120	89.52	1000	746.0

Note: Conversions not given may be obtained by adding appropriate given values.

Fraction	Decimal	Fraction	Decimal
	0.015625	33/64 =	0.515625
	0.031250	17/32 =	0.531250
	0.046875	35/64 =	0.546875
	0.062500	9/16 =	0.562500
5/64 =		37/64 =	0.578125
3/32 =			0.593750
7/64 =			0.609375
1/8 =			0.625000
	0.140625		0.640625
	0.156250		0.656250
11/64 =			0.671875
3/16 =			0.687500
13/64 =			0.703125
7/32 =			0.718750
15/64 =		,	0.734375
1/4 =			0.750000
17/64 =			0.765625
9/32 =			
19/64 =			0.781250
- 1	0.312500		0.796875
	0.328125 0.343750		0.812500
	0.359375		0.828125
	0.375000		0.843750
	0.390625		0.859375
	0.406250		0.875000
	0.421875		0.890625
	0.437500		0.906250
	0.457300		0.921875
	0.468750		0.937500
	0.484375	1	0.953125
/	0.500000		0.968750

Centigrade	Fahrenheit	Centigrade	Fahrenheit
- 18	- 0.4	52	125.6
- 16	3.2	54	129.2
- 14	6.8	56	132.8
- 12	10.4	58	136.4
- 10	14.0	60	140.0
- 8	17.6	62	143.6
- 6	21.2	64	147.2
- 4	24.8	66	150.8
-2	28.4	68	154.4
* 0	32.0	70	158.0
2	35.6	72	161.6
4	39.2	74	165.2
6	42.8	76	148.8
8	46.4	. 78	172.4
10	50.0	80	176.0
12	53.6	82	179.6
14	57.2	84	183.2
16	60.8	86	186.8
18	64.4	88	190.4
20	68.0	90	194.0
22	71.6	92	197.6
24	75.2	94	201.2
26	78.8	96	204.8
28	82.4	98	208.4
30	86.0	**100	212.0
32	89.6	102	215.6
34	93.2	104	219.2
36	96.8	106	722.8
38	100.4	108	226.4
40	104.0	110	230.0
42	107.6	112	233.6
44	111.2	114	237.2
46	114.8	116	240.8
48	118.4	118	244.4
50	122.0	120	248.0
*Freezing		**Boiling	

# CONVERSION FACTORS (continued)

These units	multiplied by	equal	These units	multiplied by	equal
amperes per square cm.	6.452	amperes per sq. inch.	ergs per second	1.341X10 <sup>-10</sup>	horse-power.
ampere-turns	1.257	gilberts.		10-10	kilowatts.
ampere-turns per cm.	2.540	ampere-turns per inch.	feet of water	62.43	pounds per square foot.
British thermal units	778.3	foot pounds.		0.4335	pounds per square inch.
	3.931X10-4	horse-power-hours.	feet per minute	0.01667	feet per second.
	1055	joules.		0.01136	miles per hour.
	2.930X10-4	kilowatt hours.	feet per second	0.5921	knots,
B.t.u. per min.	12.97	foot-pounds per sec.		0.6818	miles per hour.
	0.02357 0.01758	horse-power. kilowatts.	feet per second per second	0.01136	miles per minute.
	17.58	watts.	foot-pounds	1.285X10 <sup>-3</sup>	British thermal units.
B.t.u. per sq. ft. per min.	0.1221	watts per square inch.	1001-poonus	1.356X10'	ergs.
centimeters	3.281X10 <sup>-2</sup>	feet.		5.050X10-7	horse-power-hours.
Cemmerers	0.3937	inches.		1.356	joules.
	6.214X10-4	miles.		3.766X10-7	kilowatt-hours.
	393.7	mils.	foot-pounds per minute	1.285X10 <sup>-3</sup>	B.t. units per minute.
	1.094X10-2	vards.	roor-poones per minere	0.01667	foot pounds per second.
centimeter-dynes	7.376X10-4	pound-feet.	-	3.030X10-5	horse-power.
centimeter-grams	7.233X10-5	pound-feet.		2.260X10-5	kilowatts.
centimeters per second	1.969	feet per minute.	foot-pounds per second	7.709X10 <sup>-2</sup>	B.t. units per minute.
Tommere per second	0.03281	feet per second.		1.818X10-3	horse-power.
	0.02237	miles per hour.		1.356X10-3	kilowatts.
	3.728X10-4	miles per minute.	gallons	0.1337	cubic feet.
cms. per sec. per sec.	0.03281	feet per sec. per sec.	gunons	231	cubic inches.
circular mils	7.854X10-7	square inches.	gallons per minute	2.228X10 <sup>-3</sup>	cubic feet per second.
circolar mile	0.7854	square mils.	gausses	6.452	lines per square inch.
cubic centimeters	3.531X10-1	cubic feet.	gilberts	0.7958	ampere-turns.
coole commeters	6.102X10-2	cubic inches.	gilberts per centimeter	2.021	ampere-turns per inch.
cubic feet	1728	cubic inches.	grams	980.7	dynes.
CODIC (BO)	0.03704	cubic yards.	9.0	15.43	grains.
	7.481	gallons.		0.03527	ounces.
	59.84	pints (lig.).		0.03215	ounces (troy).
	29.92	quarts (lig.).		2.205X10 <sup>-3</sup>	pounds.
cubic feet per minute	0.1247	gallons per sec.	horse-power	42.40	B.t. units per min.
cobic feet per inmere	62.4	pounds of water per min.		33,000	foot-pounds per minute.
cubic inches	5.787X10-4	cubic feet.		550	foot-pounds per second.
	2.143X10-5	cubic yards.		1.014	horse-power (metric).
	4.329X10-3	gallons.		0.7457	kilowatts.
	1.061X10s	mil-feet.		745.7	watts.
	0.03463	pints (lig.).	horse-power (boiler)	33.520	B.t.u. per hour.
	0.01732	quarts (liq.).		9.804	kilowatts.
cubic meters	35.31	cubic feet.	horse-power-hours	2544	British thermal units.
	61,023	cubic inches.		1.98X10*	foot-pounds.
	1.308	cubic yards.		2.684X10 <sup>4</sup>	joules.
	264.2	gdllons.		0.7455	kilowatt-hours.
	2113	pints (liq.).	inches	8.333X10-2	feet.
	1057	quarts (liq.).		1.578X10-5	miles.
cubic yards	27	cubic feet.	1	101	mils.
	202.0	gallons.		2.778X10-2	yards.
cubic yards per minute	0.45	cubic feet per second.	inches of water	0.5781	ounces per square inch.
	3.367	gallons per second.		5.204	pounds per square foot
degrees (angle)	60	minutes.		0.03613	pounds per square inch.
	0.01745	radians.	joules (Int.)	9.480X10 <sup>-4</sup>	British thermal units.
	3600	seconds.		107	ergs.
degrees per second	0.01745	radians per second.		0.7378	foot-pounds.
	0.1667	revolutions per minute.		2.778X10 <sup>-4</sup>	watt-hours.
	0.002778	revolutions per second.	kilograms	980,665	dynes.
dynes	2.248X10-	pounds.		2.205	pounds.
ergs	9.480X10 <sup>-11</sup>	British thermal units.		. 1.102X10 <sup>-3</sup>	tons (short).
	1	dyne-centimeters.	kilolines	103	maxwells.
	7.378X10-4	foot-pounds.	kilowatts	56.88	B.t. units per min.
	10-7	joules.		4.427X10 <sup>4</sup>	foot-pounds per min.
ergs per second	5.688X10-°	B.t. units per minute.		737.8	foot-pounds per sec.
	4.427X10-4	foot-pounds per minute.		1.341	horse_power.
	7.378X10-4	foot-pounds per second.		103	watts.
					1

# CONVERSION FACTORS (continued)

These units	multiplied by	equal	These units	multiplied by	equal
kilowatt-hours	3413	British thermal units.	quarts (dry)	67.20	cubic inches.
	2.656X10*	foot-pounds.	quarts (liq.)	3.342X10 <sup>-2</sup>	cubic feet.
	1.341	horse-power-hours.		57.75	cubic inches.
	3.6X104	joules.	radians	57.30	degrees.
lines per square cm.	1	gausses.		3438	minutes.
lines per square inch	0.1550	gausses.		0.6366	quadrants.
lumens per sq. ft.	1	foot-candles.	radians per second	57.30	degrees per second.
moxwells	10-1	kilolines.		9.549	revolutions per minute.
megalines	10*	maxwells.		0.1592	revolutions per second.
	104	ohms.	revolutions	360	degrees.
megohms meters	3.281	feet.	revolutions	4	quadrants.
	39.37		•	6.283	radians.
		inches.	15		
	6.214X10 <sup>-4</sup>	miles.	revolutions per minute	6	degrees per second.
meters per minute	3.281	feet per minute.		0.1047	radians per second.
	0.05468	feet per second.		0.01667	revolutions per second.
	0.03728	miles per hour.	revolutions per second	360	degrees per second.
meters per second	196.8	feet per minute.		6.283	radians per second.
	3.281	feet per second.		60	revs. per minute.
	2.237	miles per hour.	revs. per sec. per sec.	6.283	radians per sec. per se
	0.03728	miles per minute.		3600	revs. per min, per min.
	10-12	megohms.		60	revs. per min. per sec.
	10-4			4.848X10-4	radians.
		ohms.	seconds (angle)		
miles per hour	5280	feet.	square centimeters	1.973X10 <sup>s</sup>	circular mils.
	6.336X10 <sup>4</sup>	inches.		1.076X10 <sup>-3</sup>	square feet.
	88	feet per minute.		0.1550	square inches.
	1.467	feet per second.	square feet	2.296X10-5	acres.
miles per hr. per sec.	1.467	feet per sec. per sec.		1.833X10 <sup>8</sup>	circular mils.
miles per minute	88	feet per second.		144	square inches.
	52.10	knots.	square inches	1.273X10°	circular mils.
	60	miles per hour.	square menes	6.944X10 <sup>-3</sup>	square feet.
	9.425X10-4			104	square mils.
mil-feet		cubic inches.			
millihenries	10-3	henries.	square meters	2.471X10-4	acres.
millimeters	3.281X10-3	feet.		10.76	square feet.
	0.03937	inches.		1550	square inches.
	6.214X10 <sup>-7</sup>	miles.		3.861X10 <sup>-7</sup>	square miles.
	39.37	mils.	square miles	640	acres.
mils	8.333X10 <sup>-5</sup>	feet.		27.88X10*	square feet.
	10-3	inches.		3.098X10 <sup>6</sup>	square yards.
minutes (anala)	2.909X10-4	radians.	square millimeters	1.973X10 <sup>1</sup>	circular mils.
minutes (angle)	10-			1.273	circular mils.
ohms		megohms.	square mils	10-4	
	104	microhms.			square inches.
ounces	0.0625	pounds.	square yards	9	square feet.
ounces (troy)	480	grains.		3.228X10 <sup>-7</sup>	square miles.
	0.08333	pounds (troy).	temp. (degs. Cent.) +273	1	abs. temp. (degs. Cent.)
ounces per square inch	0.0625	pounds per square inch.	temp. (degs. Cent.)+17.8	1.8	temp. (degs. Fahr.).
pounds (troy)	444,823	dynes.	temp. (degs. Fahr.) +460	1	abs. temp. (degs. Fahr.
	16	ounces.	temp. (degs. Fahr.) - 32	5/9	temp. (degs. Cent.).
	0.8229	pounds (av.).	tons (long)	2240	pounds.
	144	pounds-inches squared.	tons (metric)	2205	pounds.
pounds-feet squared	6.945X10-3			2000	pounds.
pounds-inches squared		pounds-feet squared.	tons (short)		
pounds of water	0.01602	cubic feet.	tons (short) per sq. ft.	13.89	pounds per square inch
	27.68	cubic inches.	tons (short) per sq. in.	2000	pounds per square inch
	0.1198	gallons.	watts	0.05688	B.t. units per min.
pounds of water per min.	2.869X10-4	cubic feet per sec.		102	ergs per second.
pounds per cubic foot	5.787X10-4	pounds per cubic inch.		44.27	foot-pounds per min.
	5.456X10-1	pounds per mil foot.		0.7378	foot-pounds per second
pounds per cubic inch	1728	pounds per cubic foot.		1.341X10 <sup>-1</sup>	horse-power.
	9.425X10-4	pounds per mil foot.		10-1	kilowatts.
			wat have		British thermal units.
pounds per square foot	0.01602	feet of water.	watt-hours	3.413	
	6.944X10 <sup>-3</sup>	pounds per square inch.		2656	foot-pounds.
pounds per square inch	2.307	feet of water.		1.341X10 <sup>-3</sup>	horse-power-hours.
	144	pounds per square foot.		10-3	kilowatt-hours.
quadrants (angle)	90	degrees.	webers	10*	maxwells.
	5400	minutes.	yards	3	feet.
	1.571	radians.	7	36	inches.
	1.5/1			5.682X10-4	miles.
				J.004A [U	miles.

# HOW TO DESIGN A MODERN LIGHTING SYSTEM

### 1. Analyze the Lighting Problem

Determine: 1) physical size and shape of the area; 2) architectural design and structural details; 3) occupancy, or end use, of the area; and 4) type and degree of severity of the seeing tasks which will exist.

# 2. Selected Needed Lighting Levels

Refer to chart "New Lighting Levels as Recommended by the Illuminating Engineering Society" or Fig. 9-53 in 3rd Edition of the IES Lighting Handbook.

### 3. Determine Desired Lighting Quality

Consider purpose for which lighting is to be used, visual envionment which is desirable, methods of light control and distribution.

## 4. Select Proper Light Sources

Consider: 1) Efficiency (I/w); 2) total light output per lamp; 3) color (spectral) quality; 4) average rated life; 5) lumen depreciation throughout life; 6) heat produced by lamp; 7) effect of ambient temperature on light output and life; 8) light distribution control; 9) stroboscopic effect.

# 5. Select Appropriate Lighting System

Consider from standpoint of suitability for architectural design, general appearance, structural details, overall efficiency, ease of maintenance, method of mounting, light distribution.

#### 6. Make a Lighting Calculation

Use appropriate method – see "Lighting Calculation Methods". Correct practice is to use the lumen method for interior lighting. Use "coefficient of utilizations" supplied by manufacturers of equipment being considered, or see Section 9 of 3rd Edition, IES Lighting Handbook.

#### 7. Prepare a Lighting Layout

Fit the number of luminaires determined by Step 6 into the area involved in a logical and practical arrangement. (Steps 6 and 7 should be worked out simultaneously, on a "trial and error" basis.)

# 8. Provide Flexible Control of System

Use multiple switch control to individual multilamp units and multi-lamp areas, or a dimmer system for all lighting circuits.

# 9. Analyze Available Electrical Power

Select the most economical and appropriate electrical distribution system possible from the available electric power system.

# 10. Check Proposed Lighting System for Practicality

Verify all dimensions, double-check all calculations. Determine "watts/sq ft", check with normal practice. Determine impact of lighting load on air conditioning, analyze heat dissipation, check for interference with structural details and other system equipments, estimate and analyze first cost and operating cost.

# HOW TO SELECT LUMINAIRES

# Type of Light Source

Consider lumens per watt, size of lamps, color quality of light produced by the lamps, lamp life and replacement cost.

# Type of Light Distribution

The type of lighting system and equipment layout selected will control the type of light distribution required for the luminaires or reflector equipment.

# Initial Lumens Required

Light loss factors, spacing of outlets, and the desired lighting intensity maintained in service will establish light output in lumens required for each luminaire.

# Overall Efficiency

Overall efficiency of luminaires varies from a high of approximately 90% downward. Consult manufacturers' light output and photometric data for luminaires únder consideration.

# Quality of Materials

Reflectors should have permanent type reflecting surface. Diffusing media should be durable, highly translucent, and should present an evenly lighted appearance. Gauge of metals should be adequate for necessary rigidity. Proper ventilation is important.

# Ease of Maintenance

Luminaires should be easy to clean and relamp, with easily removable louvers, panels, etc. Ballasts should be readily accessible.

#### Appearance

Luminaires should present a good appearance and harmonize with interior and architectural treatment where used. Plain, simple lines are usually preferred.

## Cost

Equipment cost is only part of the cost of good lighting. High first cost of equipment in a well designed lighting system may readily provide low cost lighting. Consider operating amd maintenance costs; then select a low-cost "system".

#### LAYOUT REMINDERS

For the Lighting System Designer

- A customer buys a lighting system to provide an adequate, comfortable and appropriate lighting result -- not because he wants luminaires, lamps, conduit and wiring.
- Luminaires and lighting equipment selected should be appropriate for the structure and the seeing problems involved. Appearance, functional design, direct and reflected glare, shadows, maintenance, and lighting efficiency are all factors to be considered.
- The lighting layout should fit the structural details of the building. If plans and drawings are not available, survey the interior and note location of columns, beams, obstructions and other architectural features.
- Use conventional layouts with symmetrical spacing of units, if possible, with luminaires parallel and perpendicular to walls. Special geometrical patterns may be suitable in some cases but should be avoided generally unless they serve a specific functional or design purpose.
- Use continuous-row fluorescent luminaires in preference to individual units. The completed installation will look better and usually results in economies in wiring and installation.
- Recessed and built-in lighting equipment does not light the ceiling. Check your layout and room surface reflectances to see that use of such equipment will not produce uncomfortably dark ceilings nor excessive brightness ratios in the normal field of view.

- Efficiency of trans-lighted ceilings is dependent to a great extent on the reflectance of the plenum cavity. Be sure lamps can be mounted sufficiently high above diffusers or lovers to provide uniform brightness and spaced properly to provide desired intensity. Paint entire cavity white with highest possible reflectance.
- Suspended luminaires of the direct-indirect type often produce the best lighting result most economically. Check the suspension length carefully and limit it to the dimension which gives reasonably uniform ceiling brightness.
- Luminaire spacings should be used which produce uniform illumination and prevent undesirable shadows.
- Flexible lighting layouts which will permit more luminaires or lamps to be added later should be planned. This will permit an increase in lighting intensity without spoiling the symmetry or architectural harmony of the initial installation.
- Plan the maintenance program along with the lighting layout. Be sure that all luminaires and lighting equipment are easily accessible and are designed to be cleaned easily and quickly.
- Consider the finish and reflection factor of ceiling and side walls. Recommend proper colors and finishes to provide surrounding brightness conditions which promote eye comfort and good seeing conditions.
- Double check all calculations and details to insure the proper number of units and the ultimate desired lighting result.

# Type Lighting CALCULATIONS METHODS Method of Calculation

Type Lighting	Method of Calculation
General	Lumen Method Interflectance Method Zonal Lumen Method Point-by-Point Method
Supplementary	Point-by-Point Method Lumens-per-Foot Method
Floodlighting	Beam Lumens Method Point-by-Point Method
Street	Isocandle Curves

#### LIGHTING SYSTEM VOLTAGES

ycle	High Frequency
Electric Discharge Lamps	Fluorescent Lamps
110-125 200-216 220-240	400** 600**
	Electric Discharge Lamps

\*Mercury lamp transformers.

\*\*Phase-to-phase voltage, with grounded neutral to provide less than 300 volts to ground (NEC).

#### FORMULAS FOR GENERAL LIGHTING DESIGN

#### Lumen Method of Calculation

Average lumens reaching work plane = total initial lamp lumens × CU × MF

Average footcandles at work plane = total initial lamp lumens × CU × MF area of room in sq ft

= total watts per sq ft  $\times$  overall lumens per watt  $\times$  CU  $\times$  MF

Area per lamp (sq ft) =  $\frac{\text{initial lumens per lamp} \times \text{CU} \times \text{MF}}{\text{average footcandle level desired}}$ 

Area per luminaire (sq ft) =  $\frac{\text{initial lumens per lamp} \times \text{no. of lamps per luminaire} \times \text{CU} \times \text{MF}}{\text{average footcandle level desired}}$ 

Total watts per sq ft =  $\frac{\text{average footcandle level desired}}{\text{overall lumens per watt} \times \text{CU} \times \text{MF}}$ 

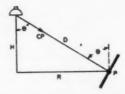
CU = Coefficient of Utilization

MF = Maintenance Factor

#### Point-by-Point Method of Calculation

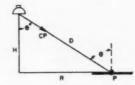
#### Illumination Normal to Light Ray:

$$E_n = \frac{CP}{D^2}$$



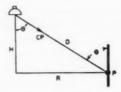
#### Horizontal Illumination:

$$E_h = \frac{CP}{D^2} \cos \theta = \frac{CP}{H^2} \cos^3 \theta = \frac{CP \times H}{D^3}$$



#### Vertical Illumination:

$$E_v = \frac{CP}{D^2} \sin \theta = \frac{CP}{H^2} \cos^2 \theta \sin \theta = \frac{CP \times R}{D^3}$$



- E<sub>n</sub> = Illumination on plane normal to light ray (footcandles)
- $E_h = Illumination on horizontal plane when light ray hits plane at angle <math>\theta$  (footcandles)
- $E_{\mathbf{v}}^{n} = \text{Illumination on vertical plane when light ray hits plane at angle } \theta$  (footcandles)
- CP = Intensity of light source in direction of point P (candlepower)
- D. = Distance from light source to point P (feet)
- H = Vertical mounting height of light source above plane of measurement (feet)
- R = Horizontal distance from light source to point P (feet)
- θ = Angle between light ray and a perpendicular line through light source (or a line perpendicular to horizontal plane through point P)

# ROOM RATIO FORMULAS Direct, Semi-Direct and General Diffuse Lighting: WxL Room Ratio= Mounting height above work plane x (W+L) Semi-Indirect and Indirect Lighting: Room Ratio= 3 x W x L 2 x ceiling height above work plane x (W+L) W = width of room L = length of room

Average Room Ratio	Range of Room Ratios	Room Index
5.0	4.5 up	A
4.0	3.5 to 4.5	В
3.0	2.75 to 3.5	С
2.5	2.25 to 2.75	D
2.0	1.75 to 2.25	E

1.38 to 1.75

1.12 to 1.38

0.9 to 1.12

0.7 to 0.9

Less than 0.7

1.5

1.25

1.00

0.8

0.6

RELATION BETWEEN ROOM RATIO

AND ROOM INDEX\*

*Room ratios are preferred because of their	
accuracy. Use this table for conversion of	
of Utilization data based on room indexes.	

۱				~~~	***				
	Wide	om th & igth t)	8	leight 10 Sen	of lumin 12 ni-Indire	15 ect and	19 Indirec	27	43
	W	L	10½ A	13½	ceiling 16½	height 21	above 1	loor (ft) 39	63
		10	0.9	0.7	0.5				
		14	1.1	0.8	0.6	0.5			
	10	18	1.24	0.9	0.7	0.5			
		24	1.3	0.9	0.7	0.6			
		30	1.4	1.0	0.8	0.6			
		14	1.3	0.9	0.7	0.6			
		20	1.5	1.1	0.9	0.7	0.5		
	14	30	1.7	1.3	1.0	0.8	0.6		
		40	1.9	1.4	1.1	8.0	0.6		
		60	2.1	1.5*	1.2	0.9	0.7	0.5	
		20	1.7	1.3	1.0	0.8	0.6		
		30	2.0	1.5	1.2	0.9	0.7		
	18	40	2.3	1.6	1.3	1.0	0.8	0.5	
		60	2.5	1.8	1.4	1.1	•0.8	0.6	
		80	2.7	2.0	1.5	1.2	0.9	0.6	
		30	2.5	1.8	1.4	1.1	0.8	0.6	
		40	2.8	2.1	1.6	1.2	0.9	0.6	
	25	60	3.2	2.4	1.9	1.4	1.1	0.7	
		80	3.5	2.5	2.0	1.5	1.2	8.0	0.5
		40	3.6	2.7	2.1	1.6	1.2	0.8	0.5
		60	4.4	-3.2	2.5	1.9	1.5	1.0	0.6
	40	80	4.9	3.6	2.8	2.1	1.6	1.1	0.7
		100	5.2	3.8	3.0	2.3	1.7	1.2	0.7
		60	5.5	4.0	3.2	2.4	1.8	1.2	0.8
	60	100	6.8	5.0	3.9	3.0	2.3	1.5	0.9
		140	7.6	5.6	4.4	3.4	2.6	1.7	1.0
		80	7.3	5.3	4.2	3.2	2.4	1.6	1.0
	80	140		6.8	5.4	4.1	3.1	2.1	1.3

**ROOM RATIOS** 

$$RR = \frac{W \times L}{H (W + L)}$$

200

100

150

200

120

160

200

100

120

7.6

6.0

5.3

6.3

7.0

6.3

4.6

4.0

4.8

5.3

4.8

5.5

6.0

3.5

3.0

3.6

4.0

3.6

4.2

4.5

2.3

2.0

2.5

2.7

2.5

2.8

3.1

1.4

1.2

1.5

1.6

1.5

1.7

1.9

For Type D, SD and GD, H = distance from luminaire to work plane 30 in. from floor.

For Type SI and 1, H = distance from ceiling to work plane 30 in. from floor.

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J

		TYPES OF LIC	GHTING SYSTEMS	
	ICI* Light Distribution	Type of Luminaires	Type of Mounting	Lighting System Classification
		Recessed	In Ceiling	Recessed (Inc. or Fl.)
		Individual Unit Continuous Row	On Ceiling	Surface Mounted Direct
		Individual Unit Continuous Row	On Ceiling	Suspended Direct
9	Direct 10% to 100% Downward	Luminous Architectural Elements	On Ceiling, Side Walls, or Columns	Architectural
		Decorative Ornamental	On Ceilings or Walls	Ornamental
		Large-Area Low-Brightness	Recessed in Ceiling	Luminous Element
		Diffuser Ceilings Louver Ceilings	From Ceilings	Translighted Ceiling
Γ.	Semi-Direct 60% to 90%	Individual Unit Continuous Row	0.6.11	Surface Mounted Semi-Direct
		Individual Unit Continuous Row	On Ceiling	Suspended Semi-Direct
	Luminous Cornice	On Wall	Architectural	
	General Diffuse	Individual Unit	On Ceiling	Suspended
	Downward	Continuous Row	Oil Colling	Direct-Indirect
		Individual Unit Continuous Row	On Ceiling	Suspended Semi-Indirect
1	iemi-Indirect 50% to 90% Jpward	Luminous Cove Wall Bracket With Downward Component	On Wall	Semi-Indirect
1	Jpwara	Luminous Ornamental	On Ceiling	Suspended Semi-Indirect
-		Individual Unit Continuous Row	On Ceiling	Suspended Indirect
1	ndirect 90% to 100% Upward	Wall Urns Cove Pedestal Ceiling Soffit**	On Wall On Wall or In Ceiling Floor or Counter Top In Ceiling	Indirect Cove Indirect Indirect**

International Congress on Illumination approved classification of lighting systems according to a range of distribution of total light output upward or downward, in percentages as shown. A more detailed classification, as given here, has been found through practice to be more practical.

\*\*According to ICI practice, soffit lighting might be classified as "direct". In actual practice, it is normally referred to as "indirect," since it is actually a form of cove lighting.

LUMINAIRE MOUNTING AND SPACING										
Mounting Height	pht COMMERCIAL							INDUSTRIAL		
of Luminaire	Direct	Semi-	Direct	Semi-Indirect Indirect		Indirect	Spread	Concentrating		
Ceiling Height for Indirect and Semi- Indirect Luminaires (feet)	Usual Spacing Between Units	Max. Spacing Between Units	Spacing* from Walls	Spacing Between Units	Spacing* from Walls	Length of Suspension	Maximum Spacing <sup>1</sup> (ft.)		g¹ (ft.)	
							Mounting	Spacing	Between	
8	7	71/2	3	9	3	1-11/2	Heights	U	nits2	
9	8	8	3	91/2	3	1-11/2	Above Floor	Spread	Concen't	
10	9	9	3½	101/2	31/2	***	15	12	-	
11	10	101/2*	3½	12	31/2	11/2-21/2	16	12	-	
12	10-12	12	4	14	4	2-3	18	18	_	
13	10-12	13	4	15	4		20	20	-	
14	10-13	15	5	17	5	3-4	22	20	-	
15	10-13	17	5	19	5		24	23	16	
16	10-13	19	6	21	6	4.5	26	25	17	
18	10-20	21	6	23	6	4-5	28	30	18	
20 or more	18-24	24	7	26	7	4-6	30 or more	30	20	

<sup>\*</sup>Spacings apply where desks or benches are next to wall, otherwise one-half the spacing between units is satisfactory.

\*Units may have to be spaced closer to obtain desired illumination values.

\*Where benches or machines are next to wall, spacing from wall should not exceed 1/3 spacing between units. Otherwise 1/2 unit spacing is suitable.

#### NEW LEVELS OF ILLUMINATION

Presented here is a condensed compilation of the new (1958) footcandle values recommended for specific visual tasks by the Illuminating Engineering Society and classified according to severity of the visual task. Note that these values apply to seeing tasks, and are detailed information, see Fig. 9-53 in the IES Lightnot "average" values for general illumination on the ing Handbook -- 3rd Edition.

horizontal plane. Higher initial levels should be provided as required by maintenance conditions, and special luminaire arrangements should be used for visual tasks in a plane other than horizontal. For more

SPECIAL APPLICATIONS - 1000 footcandles and above, (1000 fc) - Extra fine bench work, grinding; precision manual arc welding; dental chair; feature displays - show windows; self-service stores; highly critical inspection. (2000 fc) - cloth inspection, emergency room, local. (2500 fc) autopsy table; cystoscopic table; surgery operating table.

MOST DIFFICULT - 500 to 1000 footcandles. Fine bench and machine work, fine automatic machines, medium grinding, fine buffing and polishing; fine assembly; fine inspection; spotting; sewing; feature displays - show windows, service store interiors.

VERY DIFFICULT - 200 to 500 footcandles. (200 fc) - Auto final assembly, finishing, inspection line; color grading, inspection, examination in canning; repair and alteration in cleaning plant; tobacco grading and sorting; hospital fracture table; detailed drafting; designing, cartography in offices. (300 fc) - clay products color and glazing; cloth cutting; pressing; leather working - grading, matching, cutting, sewing; paint shops - extra fine hand painting and finishing.

DIFFICULT - 100 to 200 footcandles. (100 fc) - Regular office work, reading good reproductions, reading or transcribing shorthand, active filing, index reference, mail sorting; ticket counters; spray booths; general assembly line work; medium assembly; difficult inspection; medium bench and machine work, rough grinding, medium buffing and polishing; art gallery displays and on statuary; laboratory close work; etc. (150 fc) - accounting, auditing, tabulating, bookkeeping, business machine operation, rough layout drafting; bank teller's station; proof reading, imposing stones; hand and machine pressing.

ORDINARY - 30 to 100 footcandles. (50 fc) - a minimum for any visual task requiring more than casual use of the eyes; general lighting level for most industrial interiors; ordinary inspection; rough bench and machine work. (70 fc) - reading or transcribing handwriting in ink or medium pencil on good quality paper; school classrooms; work shop, bench work; study desks; drilling, riveting, screw fastening.

EASY - 30 footcandles and below. Less than 30 footcandles do not appear desirable in locations which involve visual tasks. Use in areas not involving critical or prolonged seeing, such as conference rooms, inactive files, washrooms, corridors, elevators, stairways, rough assembly, wrapping rooms, exterior areas generally, storage, auditoriums, lobbies, rough benchwork, wood sawing, parking lots, waiting rooms, rest room, smoking room, etc.

NOTE: A) Illumination values for service areas should be not less than one-fifth that in adjacent areas, and in no case should they be less than 10 footcandles.

B) In general, intensities of 200 footcandles and above should be obtained with a combination. of general lighting plus specialized supplementary lighting, taking special care to keep within recommended brightness ratios (see table).

- 70

50

30

20

15

- 10

2500 2000

1500

- 1000

700

500

# RECOMMENDED ILLUMINATION FOR RESIDENCES (Footcandles)\*

General Lighting Entrances, hallways, stairways, stair landings Living room, dining room, bedroom, family room, sun room, library, game or recreation room Kitchen, laundry, bathroom	10** 10** 30
Specific Visual Tasks  Table games Kitchen sink Kitchen range and work surfaces Laundry, trays, ironing board, ironer Reading and writing, including studying Books, magazines, newspapers Handwriting, reproduction and poor copies Desks, study Reading music scores Simple scores Simple scores Sewing Dark fabrics (fine detail, low contrast) Prolonged periods (light to medium fabrics) Occasional periods (coarse thread, large stitches, high contrast thread to fabric) Shaving, makeup, grooming; on the face at mirror locations	30 70 50 50 30 70 70 30 70 200 100

\*Minimum on the visual task.

\*\* General lighting for these areas need not be uniform.

# RECOMMENDED REFLECTANCE VALUES FOR INDUSTRIAL AREAS

Reflectance (%)		
80		
60		
35		
25 to 30		
not less than 15		

Source: IES Lighting Handbook - 3rd Edition

# RECOMMENDED SURFACE REFLECTANCES FOR OFFICES

Surface	Reflectanc Range (%)		
Ceiling finishes	80 - 92		
Walls	40 - 60		
Furniture	26 – 44		
Office machines and equipment	26 – 44		
Floors	21 – 39		

Source: IES Lighting Handbook - 3rd Edition

## RECOMMENDED BRIGHTNESS RATIOS FOR INTERIOR LIGHTING

Condition	Ratio
Between visual tasks and adjacent surroundings Example: White paper and desk top	1 to 1/3
Between visual tasks and more re- mote darker surfaces	1 to 1/10
Example: White paper on desk & floor	
Between visual tasks and more remote brighter surfaces	1 to 10
Example: White paper on desk and luminaires	
Between luminaires and adjacent surfaces in normal field of view	20 to 1
Anywhere within normal field of view	
Example: Luminaires and floor	40 to 1

These ratios are recommended as maximums: reductions are generally beneficial. See also Fig. 11–8 and Fig. 14–2 in IES Lighting Handbook — 3rd Edition

	Burning Hours Per Start				
Type of Lamps	3	6	12	Continuous*	
T-8 and T-12 preheat, rapid start, high output; T-6, T-8 and T-12 slimline; T-12 instant start; T-17 preheat; All circlines	7500	Plus 25%	-	Plus	
T-17 instant start; 6-, 8-, 13-watt T-5 preheat 14-watt T-12 preheat	6000			150%	
Power Groove lamps	5000				
4-watt T-5	4000				
Cold cathode LP	15000	Life not affected by number of starts			
Cold cathode HP	25000				

\*Light output depreciates steadily as lamps are burned. Where infrequent starting, or continuous burning are involved, lamps should be replaced before they reach average life, for maximum lighting value.

Source: General Electric Co. Lamp Bulletin No. LS-101

Type Lamps	Rated Life (Hours)
PAR-38 bulb, 100-watt	2000 - 6000
PS-25 and BT-25 bulbs, 100-watt; PS-35 bulb, 125-watt; BT-28 bulb; 175-watt; BT-37 bulb, 430-watt; T-9½ bulb, 3,000-watt	6000
BT-28 bulb, 250-watt: T-16, BT-24, BT-37 R-52, R-57 bulbs, 400-watt; BT-56 bulb, 1000-watt	6000 - 7000
BT-37 bulb, 425-watt; BT-46 bulb, 700-watt	7000
R-57 bulb, 750-watt	8000
BT-56 bulb, 700-watt	9000

Burning hours shown are "economic life" under typical operating conditions. Actual burning hours may be up to 50% greater, depending on operating conditions.

Source: Based on data shown in Fig. 8-90, IES Lighting Handbook — 3rd Edition.

Type Lamps	Rated Life (Hours)
General Service Lamps; sizes 75, 100, 150, 200, 300 watts, A and PS bulbs	750
General Service Lamps; sizes 300, 500, 750, 1000, 1500 watts, PS bulbs, mogul basé	1000
Lumiline Lamps, 30, 40, 60 watts	1500
Reflector and Projector Lamps	2000
Extended Life, Special Service Lamps 25 to 1500 watts	2500

DATA ON TYPICAL FLUORESCENT BALLASTS (Used for General Lighting)						
		Line	Watts Co	nsumed		
Number and Type Lamp		Current	Ву	Per		
Type Lump	(103)	(amps)	Ballast	Lamp*		
For 60-0	ycle, 110	-125 Vol	Circuits			
2-20/T12	3 1/3	.42	9	24.5		
2-30/T8	4	.70	17	38.5		
2-40/T12	4	.85	18	49.0		
2-40/T12/IS	9 1/3	.95	30	55.0		
2-40/T12/RS	4	1.30	13	46.5		
3-40/T12/RS	8	1.30	20	46.7		
2-48T12	9 3/4	.95	30	53.0		
2-72T12	2	1.40	29	69.5		
2-96T12	13 3/4	1.60	34	91.0		
2-48T12/HO	10	1.20	20	70.0		
2-72T12/HO	12 172	1.70	30	100.0		
2-96T12/HO	16	2.00	40	125.0		
2-48PG17	15	2.60	41	128.5		
2-72PG17	16	3.20	50	180.0		
2-96PG17	16	4.00	55	227.5		
For 60-cycle, 220-250 Volt Circuits						
2-40/T12	5 2/3	.43	20	50.0		
2-90/T17	14 1/3	.93	31	105.5		
2-40/T12/RS	4	.41	12	46.0		
2-96T12 2-96/T12/HO	12 13	1.10	29 54	88.5 132.0		
2-90/112/HO	13	1.10	34	132.0		
For 60-	cycle, 24	0-280 Vol	t Circuits			
2-40/T12	5 1/4	.37	18	49.0		
2-90/T17	14 1/3	.83	31	105.5		
2-48T 12/HO	10	.56	30	55.0		
2-48T12 4-90/T17	5 3/4	1.65	20 36	48.0 99.0		
For 60-		0-290 Vol	t Circuits			
2-40/T12	3 1/2	.19	10	45.0		
2-40/T12/RS	8	.80	10 20	45.0		
3-40/T12/RS 2-96/T12/HO	15	.55	54	132.0		
2-72T12	6	.62	25	67.5		
2-96T12	6	.62	25	86.5		

\*Lamp wattage plus proportional watts loss in ballast.

1.85

75

Based on manufacturers' bulletins.

2-96PG17

237.5

#### LAMP SPECIFICATIONS

STANDARD FLUORESCENT LAMPS						
Lamp Designation	Burnouts Per BLH*	Light C Initial Lumens	Initial L/W*	Brightness (Foot- Lamberts)		
Preh	eat Start Lan	nps (Starters	Required)			
F202T12 F40CW" F90T17 F40CW/3	134 48 26 43	1,030 2,800 5,200 3,100	51.5 70.0 57.6 77.5	1,600 2,100 2,300 2,350		
	Instant	Start Lamps				
F40T12/IS F40T17/IS F48T12 Slimline F72T12 F96T12 Slimline	54 55 57 37 26	2,650 2,650 2,600 4,100 5,600	66.2 66.6 73.2 75.6	1,900 1,150 2,100 2,100 2,100		
Repi	Repid Start Lamps (No Starters Required)					
F40CW** F40CW/3 F48T12/HO F72T12/HO F96T12/HO F48T12/1500 F72T12/1500 F96T12/1500 F48PG17 F72PG17 F796PG17	48 43 40 25 18 21 14 10 22 14	2,800 3,100 3,500 5,550 7,600 6,200 9,300 13,250 6,900 10,900	70.0 77.5 58.4 65.2 72.5 56.8 59.2 65.0 62.7 68.2 70.0	2,800 2,800 2,800 5,300 5,100 5,050		

\* Based on 7,500 hours average rated life, and lumen output of

\* Based on 7,500 hours average rarea rine, and cool white lamps.

\*\* All lumen values for cool white lamps.

\*Lumens per watt, lamp watts only

\*New 40-watt 712 lamp, interchangeable between preheaf circuits and rapid start circuits.

\*\*\* Brightness varies. See manufacturers' literature for details.

Source: General Electric Co., Lamp Dept., and IES Lighting Handbook — 3rd Edition

COLD CATHODE FLUORESCENT LAMPS					
Lamp	Lamp	Lamp	Light (	Output	Brightness
Designation	signation Current Watts	Watts (HP)*	Initial Lumens	Initial L/W	(Foot- Lamberts)
	120	28	1000	35.8	1100
2545 (T-8)	150	33	1200	32.5	1280
	200	40	1500	37.5	1600
	120	37	1600	43.3	1210
2569 (T8)	150	43	1850	43.0	1440
	200	52	2200	42.4	1650
	120	46	2200	47.8	1250
2593 (T8)	150	54	2600	48.2	1480
	200	65	3200	49.4	1700
Hairpin	120	46	2200	47.8	1250
6-in. Dia.	150	54	2600	48.2	1480
	200	65	3200	49.4	1700

\*High Pressure

Source: Based on data in Fig. 8—101, IES Lighting Handbook — 3rd Edition

#### STANDARD INCANDESCENT LAMPS

Lamp Designation		Rated	Burnouts	Light	Output
Watts	Bulb	Life (Hours)	Per BLH**	Initial Lumens	Initial L/W
75	A-19	750		1,150	15.3
100	A-19*	750		1,700	17.0
150	A-23	750		2,700	18.0
200	PS-25	750	351	3,800	19.0
200	PS-30	750	360	3,720	18.6
300	PS-30	750	223	6,000	20.0
300	PS-35	1000	174	5,750	19.2
500	PS-40	1000	109	9,900	19.8
750	PS-52*	1000	60	16,700	22.3
1000	PS-52*	1000	44	23,000	23.0
1500	PS - 52	1000	30	33,000	22.0
750	T-24	1000	70	14,200	19.0
1000	T-24	1000	50	20,000	20.0
500	R-52	2000	64	7,850	15.8
750	R-52	2000	39	12,700	17.0
1000	RB-52*	2000	28	18,000	18.0
550	R-57	2000	62	8,100	14.8
800	R-57	2000	37	13,500	16.9
1000	R-57	2000	31	16,300	16.3

\* Coiled-coil filament axially mounted.

\*\* Average lamp burnouts per billion lumen hours (calculated).

Source: General Electric Co., Lamp Department, and IES Lighting Handbook — 3rd Edition.

#### STANDARD MERCURY VAPOR LAMPS

Lam	p Designation		Lamp Designation			Burnouts	Initial	Initial
Watts	Bulb	ASA*	(Hours)	Per BLH**	Lumens	L/W***		
100	PS-25	H4AC	6000	42	4,000	40.0		
175	BT-28	H22KD	6000	23	7,200	41.1		
250	BT-28	H5KF	6-7000	16-14	10,500	42.0		
400	BT-24	H25DE	6-7000	11.9	15,500	38.7		
400	BT-37	HILB	6-7000	7-6	23,000	57.4		
425	BT-37	H17LB	7000	7	20,000	47.5		
430	BT-37	H24LB	6000	9	18,500	43.0		
700	BT-46	H18NE	7000	3.6	40,000	57.2		
700	BT-56	H15GW	9000	4.2	34,500	49.4		
750	R-57	-	8000	5.5	22,500	30.0		
1000	BT-56	H18GW	6-7000	3.2.2.8	51,800	51.8		
1000	BT-56	H12GW	6-7000	2.9-2.5	58,000	58.0		
3000	T-91/2	H9FJ	6000	1.3	132.000	43.0		

\* New ASA designations have been adopted by all light source manufacturers.

\*\* Average lamp burnouts per billion lumen hours (calculated), based on average rated life. Lamp life may be increased by as much as 50% under certain operating conditions.

\*\*\* Based on lamp watts only.

Source: Based on data given in Fig. 8-90, IES Lighting Handbook  $-3\mathrm{rd}$  Edition.

R	EFLEC	TOR AND	PROJE	CTOR LAMPS		
Bulb Types	Watts	Beam Spread (Degrees)*	Approx. Beam Lumens	Candle- power (10% Cone)**	Approx. Total Lumens	
	R	eflector Sp	otlightin	g Lamps		
R-30 R-40 R-40 R-40	75 150 300 500	50 40 35 35	400 810 1,800 3,100	1,800 6,000 13,500 22,000	770 1,780 3,700 6,400	
	Re	flector Flo	odlighti	ng Lamps	ri,	
R-20 R-30 R-40 R-40 R-40	30 75 150 300 500	80 130 110 115 115	145 610 1,500 2,800 5,400	350 430 1,250 2,700 5,200	200 770 1,780 3,700 6,400	
Projector Spotlighting Lamps						
PAR-38 PAR-38 PAR-46 PAR-56 PAR-64	75 150 200 300 500	30 x 30 30 x 30 17 x 23 15 x 20 13 x 20	480 1,100 1,200 1,800 3,000	4,000 10,500 32,000 70,000 110,000	750 1,730 2,350 3,650 6,000	
	P	rojector Flo	oodlighti	ng Lamps		
PAR-38 PAR-38 PAR-46 PAR-56 PAR-56 PAR-64	75 150 200 300 300 500 500	60×60 60×60 20×40 20×35 30×60 20×35 35×65	600 1,350 1,300 2,000 2,100 3,400 3,500	1,700 3,700 11,000 22,000 10,000 35,000 12,000	750 1,730 2,350 3,650 3,650 6,000 6,000	

\*Measured to 10% of maximum candlepower \*\*Average initial CP in 10° zone

Source: G.E. Co. Lamp Bulletin LS-152, Feb. 1959

# COMPARATIVE STROBOSCOPIC EFFECT OF VARIOUS LIGHT SOURCES Operated on 60-Cycle Supply

Lamp Type	Method of Operation	Relative Stroboscopic Effect
	Incandescent	
200-watt		1
40-watt	7	
	Fluorescent	
Green	Single-lamp ballast	11
Blue	Single-Lamp ballast	49
White Single-lamp ballast		19
White 2-lamp ballast		9
White	Single-lamp ballast on each phase of 3-phase circuit (3 lamps)	3
White	3 lamps: 1 on single-lamp ballast, 2 on 2-lamp ballast	14

Also see Figs. 8-48 and 8-49 in IES Lighting Handbook 3rd Edition

Source: Westinghouse Lighting Handbook (1956)

#### COLOR TEMPERATURE OF VARIOUS LIGHT SOURCES

Light Source	Degrees K*			
Natural Daylight				
Light from clear blue sky	12,000-27,000			
Light from hazy or smoky sky	7,500-8,400			
Light from totally overcast sky	6800			
Sunlight, plus light from clear sky (noon)	6500			
Direct sunlight (noon in midsummer)	5800			
Light from heated source	s**			
"Daylight" fluorescent lamps**	6500			
Blue (daylight) photoflash lamps	6300			
Cool white fluorescent lamps**	4500			
Clear photoflash lamps	3800			
White (standard) fluorescent lamps**	3500			
Photoflood lamps	3400			
500-watt projection lamp	3175			
1000-watt standard incandescent lamp	3000			
500-watt standard incandescent lamp	2950			
60-watt standard incandescent lamp	2800			

\*Absolute temperature scale having its zero at -273°C

(-459.4°F).

\*\*By definition, color temperature applies only to light generated by heat (same color as a black body at that temperature), but fluorescent lamps have been arbitrarily color-designated in degrees Kelvin for purposes of simplicity.

#### FLUORESCENT LAMP **LUMEN OUTPUT RATIOS**

(Standard Cool White = 100)

Color of lamps	Multiplying Factor	
Deluxe Cool White (CW/X)	0.71	
Deluxe Warm White (WW/X)	0.71	
Daylight (D)	0.93	
Soft White (SW)	0.68	
Green (G)	1.20	
Gold (GO)	0.60	
Blue or Pink (B or PK)	0.45	
Red (R)	0.06	

#### INTERCHANGEABILITY OF FLUORESCENT LAMPS 40-watt T-12 Bipin

Lamp	Ballast Type				
Туре	Preheat	Instant Start	Rapid Start		
Preheat Instant Rapid Start	O.K. Will Not Start O.K.	Not Recommended O.K. Not Recommended	Will Not Start Will Not Start O.K.		

Source: IES Lighting Handbook - 3rd Edition.

Fluorescent Lamps				1-Lar	np Lumina	ire	2-Lamp Luminaire*		
Type Lamp	Length (ins)	Lamp Watts	Lamp Current (ma)	Lumens	Total Watts	L/W	Lumens	Total Watts	L/W
40T12	48	39.6	430	2,650	50.6	52.4	5300	97.2	54.5
40T12	48	-	-	2,800	-	_	5600		
40T12/15	48	40.6	425	2,500	60.0	41.6	5000	100.0	50.
40T12/R5	48	39.6	430	2,650	52.0	51.0	5300	92.0	57.
40CW/3	48	-	-	3,100	-	-	6200		
48T12	48	38.5	428	2,360	- 1	-	4720	107.0	44.
48T12	48	38.5	426	2,360	-	-	4720	• 97.0	48.
48T12/RS	48	60.0	800	3,350	90.0	37.2	6700	140.0	47.
48T12/RS	48	109.0	1500	6,200	-	-	12,400	250.0	49.
48PG17	48	107.0	1500	6,000	-	-	12,000	255.0	47.
40T17/15	60	42.5	420	2,500	62.5	40.0	5000	105.0	47.
90T17	60	90.0	1550	5,200	111.0	46.9	10,400	211.0	49.
72 T 12	72	56.0	425	3,600	-	-	7,200	146.0	49.
72T12	72	56.0	425	3,600	-	-	7,200	●137.0	52.
72T12/RS	72	80.5	800	5,250	125.0	42.0	10,500	200.0	52.
72T12/RS	72 72	157.0	1500	9,300	-	-	18,600	390.0	47.
72PG17	72	155.0	1500	9,300	-	-	18,600	360.0	51.
96T12	96	73.5	425	5,100	-	-	10,200	181.0	56.
96T12	96	73.5	425	5,100	-	-	10,200	●175.0	58.
96T12/RS	96	105.0	800	7,300	135.0	54.1	14,600	254.0	57
96T12/RS	96	204.0	1500	13,250	-	-	26,500	480.0	55.
96PG17	96	215.0	1500	15,000	-	-	30,000	485.0	61.

<sup>\*</sup>Using HPF lead-lag ballasts and standard cool white lamps. For lumen output using other color lamps, use the multiplying factors given in table "Fluorescent Lamp Lumen Output Ratios"

Source: Computed based on data in Figs. 8-98, 8-99, 8-100 and 8-103 of IES Lighting Handbook — 3rd Edition, and General Electric Co. Bulletin LS-101, July, 1958.

	Delu	Standard		
Application	Warm	Cool	Warm	Coo
Groceries	-	Good	-	Fair
Meat Markets	-	Good	-	Fair
Bakeries	Good	Fair	-	-
Confectionery	Good	Fair	-	-
Restaurants	Good	-	-	-
Tea Rooms	Good	-	-	-
Taverns	Good	-	Fair	-
Men's Wear	Fair	Good	-	Fair
Women's Wear	Good	-	Fair	-
Children's Wear	Good	-	Fair	-
Shoe Store	Good	-	Fair	-
Barber & Beauty*	Good*	Fair	-	-
Drug Stores	-	Good	-	Fai
Florist	Fair	Good	-	-
Jewelry	-	Good	-	Fai
Home Furnishings	Good	Fair	-	-
Variety	-	Good	-	Fai
Schools	- 1	-	-	Goo
Offices	-	-	Good	Fai

\*Except for tinting

Source: Lighting Products Inc.

EFFICIE	NCY	OF	P	RODUCTION
OF (	COL	ORE	D	LIGHT

	Approx. Lumens per Watt							
Color	Fluorescent	Filament*						
Blue	20 to 26	0.5 to 1.5						
Green	55 to 75	0.5 to 3						
Yellow	22 to 31	5 to 10						
Red	3 to 5	1 to 14						

<sup>\*</sup>Based on 100-watt lamp with typical color filters of various kinds; colored Bulbs, glass roundels and caps, gelatins, dyes and lacquers.

Source: Westinghouse Lighting Handbook - 1956.

Based on use of 2-lamp series ballasts.

#### MAINTENANCE STEPS FOR INCREASED LIGHTING LEVELS Average Illumination found in plant having poor lighting maintenance Initial-33 FC. Clean lamps and reflectors After cleaning - 41 FC. Replace burned-out lamps Burned out lamps replaced-45 FC. Group replace all lamps All lamps group replaced -56 FC. Correct the voltage Voltage increased to normal rating-58 FC. Repaint Ceiling and side walls repainted in light colors - 68 FC. Old luminaires replaced with efficient new units - 75 FC. 20 30 10 40 50 60 70 80 ILLUMINATION LEVELS IN FOOTCANDLES

Lighting maintenance is a highly important factor in lighting system design. The above chart illustrates its effectiveness on a typical lighting installation. Increased reflectances, improved brightness ratios, and higher lighting levels may be effected through simple maintenance procedures.

Select luminaires and lighting equipment which include easy maintenance features designed and built into the units by the lighting equipment manufacturers; and provide easy access to all luminaires and lighting equipment.

Cause of Depreciation	Percent
	Loss
Lamp Depreciation (End of rated life)	
Incandescent	20
Fluorescent	30
Mercury Vapor	23
Circuit Voltage Depreciation	
With adequate wiring	Negligible
With poor wiring and overloading of	
circuits	5-20
Luminaire Light Absorption	18-35
Paint Depreciation	
Absorption of light by walls, ceilings,	5
floors and other surfaces	(per year)
Dirt and Dust Depreciation	
1-month cleaning intervals	10
3-month cleaning intervals	15
6-month cleaning intervals	20
Cleaned when lamps burn out	30
Lamp Outage Depreciation	Up to 12

TYPES OF M. Used f		ANCE Eding Service		NT.				
Equipment	Mounting Height (Feet)							
	To 12	12-18	18-30	Oyer 30				
Catwalk (Or Truss)			Х	X				
Crane (Where Available)			X	X				
Crows-Nest Ladder			X					
Disconnecting Hanger		X	X	X				
Portable Mainte nance Platform		x	×					
Relamping Bridge			X	X				
Step Ladder	X							
Straight Ladder		X						
Telescoping Plate form Tower		×	x					

Source		
Condle (luminous efficiency equivalent)	0.1	
Oil lamp (luminous efficient equivalent)	0.3	
Original incandescent lamp (1879)	1.4	
60-watt carbon filament lamp (1905)	4.0	
60-watt coiled coil tungsten filament lamp (1954)	13.9	
1000-watt general service lamp (1959)	23.0	
No. 1 photoflood lamp (1959)	34.4	
1000-watt Type H12KP (ASA)mercury vapor lamp (1958)	58.0	
40-watt cool white fluorescent lamp, lamp only (1959) *Initial value, lamp only	77.5	

Luminaire	Distribution and	Ceiling	80	0%	509	6
	Maximum	Walls	50%	30%	50%	10%
Туре	Spacing	Room Ratio		Coefficients	of Utilization	
		Direc	t Lighting			
1-Lamp	0% Up	1.0	.43	.40	.42	.37
Aluminum	60% Down	1.5	.50	.47	.49	.44
Troffer	0.8 x MH	2.5	.55	.53	.54	.50
Baffled		4.0	.59	.57	.56	.54
3-Lamp	0% Up	1.0	.37	.31	.35	.27
24" Troffer	60% Down	1.5	.45	.40	.43	.35
Diffusing	0.9 x MH	2.5	.52	.48	.49	.43
Plastic		4.0	.56	.54	.54	.50
Mercury	0% Up	1.0	.48	.45	.47	.42
Aluminum	70% Down	1.5	.57	.53	.55	.50
High Bay	0.9 x MH	2.5	.64	.61	.62	.58
3 2.2)		4.0	.68	.66	.66	.63
Mercury	0% Up	1.0	.50	.46	.49	.42
Porcelain	75% Down	1.5	.59	.55	.58	.52
High Bay	1.0 x MH	2.5	.67	.64	.66	.61
Ventilated		4.0	.74	.70	.71	.67
Mercury	0% Up	3.0	.67	.63	.64	.60
Prismatic	70% Down	1.5	.73	.70	.69	.65
High Bay	0.6 x MH	2.5	.78	.75	.74	.70
g., 2-7		4.0	.81	.79	.76	.74
		Semi-Dire	ect Lighting			
4-Lamp	10% Up	1.0	.27	.23	.25	.19
Enclosed	50% Down	1.5	.34	.30	.30	.25
Diffusing	1.0 x MH	2,5	.40	.37	.36	.32
Plastic		4.0	.45	.41	.40	.36
2-Lamp	10% Up	1.0	.47	.41	.45	.36
Porcelain	70% Down	1.5	.60	.54	.56	.48
Industrial	1.0 x MH	2.5	.71	.65	.66	.59
Reflector		4.0	.78	.74	.73	.67
2-Lamp	10% Up	1.0	.46	.38	.42	.33
Bare	80% Down	1.5	.58	.51	.53	.44
Lamp	1.0 x MH	2.5	69	.63	.64	.55
Channel		4.0	.77	.72	.71	.64
		Direct - Inc	lirect Lightin	9		
Multilamp	30% Up	1.0	.31	.27	.28	.22
Metal	35% Down	1.5	.37	.33	.32	.27
Panels and	1.1 × MH	2.5	.44	.41	.39	.34
Louvers		4.0	.50	.47	.42	.39
2-Lamp	45% Up	1.0	.37	.30	.32	.24
Metal Sides	35% Down	1.5	.46	.40	.38	.31
Louver	1.2 x MH	2.5	.57	.51	.47	.40
Shielding		4.0	.63	.59	.51	.45

Luminaire	Distribution and	Ceiling	1	30%	50	)%
Туре	Maximum	Walls	50%	30%	50%	10%
	Spacing	Room Ratio		Coefficients	of Utilization	
		Semi-Indire	ect Lighting			
4-Lamp	60% Up	1.0	.26	.20	.19	.12
Translucent	15% Down	1.5	.36	.30	.25	.18
Sides and	1.2 x MH	2.5	.46	.40	.32	.25
Bottom		4.0	.54	.50	.37	.32
Fluorescent	65% Up	1.0	.27	.21	.20	
Grid	10% Down	1.5	.37	.30	.26	.13
Luminous	1.2 x MH	2.5	.48			.19
Indirect	1.2 X MIT	4.0	.56	.42	.33	.26
mairect				.51	.38	.33
	(For 1)		Lighting	1		
Luminous	65% Up	1.0	.19	.14	.13	.07
Indirect	5% Down	1.5	.26	.20	.18	.12
Fluorescent	1.2 x MH	2.5	.35	.30	.24	.18
		4.0	.39	.37	.27	.23
Silvered	85% Up	1.0	.24	.16	.17	.08
Bowl	0% Down	1.5	.35	.26	.23	.13
Indirect	1.2 x MH	2.5	.48	.40	.29	.21
		4.0	.57	.52	.36	.29
Fluorescent	Cove	1.0	.18	.15	.10	.07
Cove	12" to 18"	1.5	.25	.21	.15	.11
Without	Below	2.5	.33	.30	.20	.17
Reflector	Ceiling	4.0	.36	.34	.22	.20
		Luminous Cei	ling Lighting			
Extended area	system using	1.0	.31	.26	-	_
diffusing glass		1.5	.40	.35	_	-
	reflectance 75%	2.5	.49	.46	-	_
		4.0	.56	.54	_	_
Extended area	system using	1.0	.25	.22	-	_
opaque white l		1.5	.30	.26	_	_
	reflectance 75%	2.5	.33	.31		
Coming Curry	, or recidine 73/0	4.0	.35	.34	_	_
	lues are based on flo CU values by percent	or of 10% reflecta	nce.			
Percentage inc	crease for floors	1.0	5%	3%	4%	1%
having 30% ref		1.5	7%	6%	5%	2%
as compared w		2.5	10%	8%	7%	4%

NOTE: Coefficients of Utilization shown above here were condensed from Fig. 9–3, IES Lighting Handbook – 3rd Edition, covering popular types of luminaires only. CU values are shown for four roomratios only (1.0, 1.5, 2.5 and 4.0). Interpolate for other room ratios, or refer to manufacturers' complete CU data for specific luminaires when greater accuracy is required.

#### FIG. 1. FRAME FLOORS (Heat flow down)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

#### HEAT LOSS FACTORS

To adjust	these	factors	for	insulation,
see Figs.	16-	20.		

	Type of floor above joists Wood subfloor (25/32 in.) and felt plus							
Type of ceiling below joists*	Cement (1½ in.) and ceramic tile (½ in.)	Hard- wood floor (¾ in.)	Plywood (% in.) and floor tile or linoleum (% in.)	Insulating board (1/4 in.) and hardboard (1/4 in.) and floor tile or linoleum (1/4 in.)				
No ceiling below; bottom of joists exposed								
to basement or crawl space	.091	.082	.079	.072				
Metal lath and plaster (¾ in.)	.064	.060	.058	.054				
Gypsum board (% in.)	.061	.057	.056	. 052				
Wood lath and plaster	.060	.056	.055	.051				
Gypsum lath (% in.) and plaster	.060	.056	.055	.051				
Insulating board (1/2 in.)	.050	.047	.046	.043				
Insulating board lath (1/2 in.) and plaster	.049	.046	.045	.043				
Acoustical tile (¾ in.) on wood furring Acoustical tile (¾ in.) on gypsum board	.047	.045	.044	.041				
(3/4 in.)	.045	.042	.041	.039				

<sup>\*</sup> Plaster assumed of sand-aggregate,  $\frac{1}{2}$ -in. thick, unless otherwise specified.

#### FIG. 2. CONCRETE FLOORS (Heat flow down)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

		NI-	Ceiling applied			Ceiling suspended below slab						
Concrete deck (inches)	Type of finish floor above slab	No directly to finish concrete slab		Gypsum board		ypsum board (% in.) Metal		Acoustical tile				
		bare concrete slab (1/8 in.)			With-   With		ith- With and		On furring or channels		On gypsum board (¾ in.)	
			(% in.)	1/2 in.	3/4 in.	out plaster	plaster (¾ in.)	(¾ in.)	1/2 in.	3/4 in.	1/2 in.	¾ in.
	Bare slab; no finish floor above Floor tile or linoleum (1/s in.) or ceramic	.131	.130	.086	.073	.077	.075	.081	.064	. 056	.059	. 053
4 to 6	tile on terrazzo (1 in.).  Wood block (13/16 in.).  Wood subfloor (25/32 in.), felt and hard-	.128	.127	.085	.072	.076	.075	.080	.062	.054	.058	.052
	wood (¾ in.) on sleepers	.061	.061	.049	.045	.046	.045	.048	.041	.038	.039	.036
	Bare slab; no finish floor above Floor tile or linoleum (1/s in.) or ceramic		.114	.079	.068	.071	.070	.075	.058	.053	.056	.050
8 to 10	tile on terrazzo (1 in.)	.089	.112	.078	.067	.071	.069	.074	.058	.052	.055	.050
	wood (% in.) on sleepers	.057	.057	.047-	.043	.044	.043	.045	.039	.036	.037	.035

#### FIG. 3. CONCRETE CEILINGS (Heat flow up)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

		No		ng appl			Ceil	ing suspe	nded be	low sla	b	
Concrete	7 (0:1011)	finish			Gypsum board (% in.)  With- With		Metal	Acoustical tile				
deck (inches)	Type of finish floor above slab	bare concrete		Acoustical tile			lath and	On furring or channels		On gypsun board (% i		
		slab	(½ in.)	½ in.	3/4 in.	out plaster	plaster (¾ in.)	plaster (¾ in.)	1/2 in.	34 in.	½ in.	34 in.
	Bare slab; no finish floor above Floor tile or linoleum (1/s in.) or ceramic	.181	. 179	.104	.086	.105	,102	.113	.082	.069	.074	.064
4 to 6	tile on terrazzo (1 in.)	.175	.173	.102	.085	.103	.100	.110	.079	.068	.073	.064
	Wood subfloor (25/32 in.), felt and hard- wood (¾ in.) on sleepers	.070	.070	.056	.049	.055	.053	.057	.047	.043	.045	.041
	Bare slab; no finish floor above	.151	.149	.094	.079	.094	.092	.100	.074	.064	.068	.060
8 to 10	tile on terrazzo (1 in.)	.147	.146	.092	.078	.093	.090	.099	.073	.064	.067	.060
	wood (% in.) on sleepers	.065	.065	.052	.047	.052	.051	.054	.045	.041	.043	.039

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1. Did you find th	e Electrical Products	Guide	usef	ul in	you	r work?			Yes (	}		No	( )
2. Do you still have	ve your 1960 issue	of the E	lectr	ical	Proc	lucts Guide?			Yes (	)		No	( )
	n did you use your (		Do	ily (	)	Twice a Week ( )	Onc	e a	Weel	k (	)		
4. About how ofte types of produc		asion to	refe	er to	the	Guide for the names of	man	ufaci	urers	of	the	follo	wing
	Types of Products:	Was or mo			iom ever		Wee or mo		Selde or ne				
	Wiring Devices	1	)	(	)	Transformers	(	)	-	)			
	Wire and Cable	- (	)	(	)	Tools	(	)	(	)			
	Motor Controls	(	)	-	)	Signal Equip.	(	)	(	)			
	Electric Heating	(	)	(	)	Conduit & Raceway	(	)	(	)			
	Lighting Fixtures	(	)	(	)	Insulating mtls.	(	)	(	)			
	Motors	(	)	1	)	Boxes & Fittings	(	)	(	)			
5. What specifica	lly have you bought	or spec	ified	as o	a re:	sult of looking it up in the	Guide	?					
Product		м	anufa	ctures		Did or	der res	ult?					
													_
Thank you for your	time. Your title o	r respo	nsibi	lity?.									_
	Type of co	mpany?											
													32a

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NEW YORK 36, N.Y.

First Class
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New York, N.Y.



McGraw-Hill Publishing Co., Inc.

#### ELECTRIC SPACE HEATING DATA (continued)

#### FIG. 4. MASONRY WALLS (Heat flow outward) TRANSMISSION HEAT LOSS (Walts per sq ft per dea F temp diff)

									Exterio	r finish								
		F		ck (4 i			4 in.) o	OF .							(4 in.) : te (8 in			
Interior finish*		crete b			w clay			oncret	-	-	crete b			w clay			oncret	
			Thick	ness o	f back	ing (in	ches)					Thick	ness o	back	ng (inc	hes)		
	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12	4	8	12
Bare masonry wall; no interior finish.	.143	.120	.112	.120	.092	.077	.177	.161	.148	.123	.108	.100	.106	.084	.071	.147	.137	.127
Plaster (% in.) applied directly to masonry		.115		.115			1		.140		.102			.081	.069		.130	
furring	.093	.083	.079	.083	.069	.060	.106	.100	.096	.084	.076	.073	.076	.064	.056	.095	091	.086
Gypsum lath (% in.) on furring Wood lath or gypsum lath (% in.)	.088	.079	.075	.079	.066	.058	.100	.095	.090	.080	.072	.070	.072	.061	.054	.090	.086	.082
and plaster on furring	.086	.077	.074	.077	.065	.057	.097		.088		.071	.068	.071	.060				
plaster on furring	.065	.060	.058	.060	.052	.047	.071	.068	.066	.061	.056	.054	.056	.049	.044	.066	.064	.067

#### FIG. 5. FRAME CEILINGS (Heat flow up)

			Ty	pe of floor abo	ve joists				
	No floor		Wood subfloor (25/32 in.) and felt plus						
Type of ceiling below joists*	above. Top of joists exposed to ventilated attic space	Wood subfloor only (25/32 in.)	Cement (1½ in.) and ceramic tile (½ in.)	Hardwood Roor (34 in.)	Ptywood (% in.) and floor tile or linoleum (% in.	Insulating board (1/2 in.) and hardboard (1/4 in.) and floor tile or linoleum (1/2 in.)			
Metal lath and plaster (% in.)	.217 .190 .181 .180	.092 .087 :085 .085	.082 .078 .076 .076	.075 .071 .070	.072 .069 .068 .068	.066 .063 .062 .062			
nsulating board (½ in.)	.098	.065 .064 .061 .057	.060 .059 .056	.056 .055 .053	.055 .054 .051	.051 .050 .048 .046			

#### FIG. 6. FRAME WALLS (Heat flow outward)

							Exte	erior finis	ih**						
Interior	W		ing, woo wood pa		es,	Wood shingles with insulated backer board or asphalt insulating siding					Brick veneer or plywood (% in.)				
finish*	Sheathing					Sheathing					Sheathing				
	Ply- wood	Gyp-	Wood	Insule		Ply- wood	Gyp-	Wood	Insulo		Ply- wood	Gyp-	Wood		ating ard
	board	., 500	1/2 in.	1 in.	wood	board		½ in.	1 in.		board	Wood	1/2 in.	1 in.	
Metal lath and plaster (% in.)	.092	.091	.077	.072	.061	.081	.080	.069	.065	.056	,105	.103	.086	.079	.060
plywood (1/4 in.)	.087	.086	.073	.069	.059	.075	.074	.064	.061	.053	.099	.097	.081	.076	.06
(% in.) and plaster Wood panels (% in.) Insulating board lath (½ in.)	.085	.084	.072	.067	.058	.073	.072	.063	.059	.052	.096	.094	.079	.074	.06
and plaster	.064	.064	.056	.054	.047	.057	.057	.051	.049	.043	.071	.070	.061	.058	.05

<sup>\*</sup> Plaster assumed of sand-aggregate, ½-1n. thick, unless otherwise specified.

\*\* Sheathing details: Gypsum ½"; Plywood 5/16"; Wood 25/32" plus building paper; Insulating Board 25/32". Furring strips 1" thick are assumed between wood shingles and gypsum, plywood and insulating board.

#### FIG. 7. HEAT LOSS CONVERSION TABLE

#### HEAT LOSS **FACTORS**

Btu per hr	Watts								
.01	.0029	.21	.062	.41	.120	.61	.179	.81	.237
.02	.0059	.22	.064	.42	.123	.62	.182	.82	.240
.03	.0088	.23	.067	.43	.126	.63	.185	.83	.243
.04	.0117	.24	.070	.44	.129	.64	.188	.84	.246
.05	.0146	.25	.073	.45	.132	.65	.190	.85	.249
.06	.0176	.26	.076	.46	.135	.66	.193	.86	.252
.07	.0205	.27	.079	.47	.138	.67	.196	.87	.255
.08	.0234	.28	.082	.48	.141	.68	.199	.88	.258
.09	.0264	.29	.085	.49	.144	.69	.202	.89	.261
.10	.029	.30	.088	.50	.146	.70	.205	.90	.264
.11	.032	.31	.091	.51	.149	.71	.208	.91	.267
.12	.035	.32	.094	.52	.152	.72	.211	.92	.270
.13	.038	.33	.097	.53	.155	.73	.214	.93	.272
.14	.041	.34	.100	.54	.158	.74	.217	.94	.275
.15	.044	.35	.103	.55	.161	.75	.220	.95	.278
.16	.047	.36	.105	.56	.164	.76	.223	.96	.281
.17	.050	.37	.108	.57	.167	.77	.226	.97	.284
.18	.053	.38	.111	.58	.170	.78	.229	.98	.287
.19	.056	.39	.114	.59	.173	.79	.231	.99	.290
.20	.059	.40	.117	.60	.176	.80	.234	1.00	.293

#### FIG. 8. INFILTRATION

(Watts per cu ft per deg F temp diff)

½ air change per hr	1 air change per hr	2 air changes per hr
.0027	.0053	.0106

#### FIG. 9. HOLLOW GLASS BLOCKS

(Heat flow horizontal)

TRANSMISSION HEAT LOSS (watts per sq ft per deg F temp diff)

Nominal size (inches)	Undivided cavity	With glass fiber dividing cavity
6 x 6 x 4 thick	.176	
8 x 8 x 4 thick	.165	.141
12 x 12 x 4 thick	.153	.129

#### FIG. 10. CONCRETE FLOOR SLABS\*

(Unheated)

TRANSMISSION HEAT LOSS (Watts per ft of exposed edge)

Outdoor design temperature (deg F)	Edge insulation thickness (inches)**						
remperature (deg r)	1	2					
-20 to -30	16	14.5					
-10 to -20	14.5	13					
0 to -10	13.5	12					

\* At or near grade level

#### FIG. 11. BASEMENT WALLS AND FLOORS

(Below grade)\*

TRANSMISSION HEAT LOSS\*\* (Watts per sq ft)

Ground water temperature (deg F)	Walls	Floors
40	1.76	0.88
50	1.17	0.59
60	0.59	0.29

\* Representative concrete or concrete block construction

\*\* Based on 70F indoor design temperature

<sup>\*\*</sup> Insulation should extend 24 in, horizontally under slgb; (f 24 in, down along the foundation wall below slab level.

#### ELECTRIC SPACE HEATING DATA (continued)

#### FIG. 12.

#### **BASEMENT WALLS**

(Above grade)

#### TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Wall	Concrete (sand aggregate)		rete block oval core)
(in.)	(some aggregate)	Cinder aggregate	Sand and grave aggregate
8	.197	.114	.150
10	.178		
12	.162	.107	.138

#### FIG. 13.

#### SKYLIGHTS

(Heat flow up)

TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Your of such	C:I-	Tw	sheets of	glass
Type of sash	Single glass	¼-in. air space	½-in. air space	1-in. or more air space
Large sheets of glass; no sash	.410	.205	.194	.185
Wood*	.370	.185	.174	.100
Steel*	.410	.206	.194	.185
Aluminum*	.451	.226	.212	.203

<sup>\* 80%</sup> glass, 20% sash.

#### FIG. 14.

#### WINDOWS

(Heat flow horizontal)

#### TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Type of sash	Single	1	type plazing * *	Single glass with storm sash		
Type or susn	glass	1/4-in. air space	½-in. air space	½-in. air space	1-in. or more air space	
Large sheets; no sash	.331	.179	.161	.161	.155	
Wood*	.299	.161	.153	.147	.141	
Steel*	.331	.179	.194	.161	.155	
Aluminum*	.365	.197	.210	.179	.170	

<sup>\*</sup> Windows assumed 80% glass, 20% sash

#### FIG. 15.

#### SOLID WOOD DOORS

(Heat flow outward)

#### TRANSMISSION HEAT LOSS (Watts per sq ft per deg F temp diff)

Door thick	ness (in.)	Exposed door	With glass		
Nominal	Actual		storm door		
Thin panel*		.249	:114		
1	25/32	.188	.108		
1 1/4	1 1/16	.161	.100		
1 1/2	1 5/16	.144	.094		
1 3/4	1 3/8	.141	.091		
2	1 5/8	.126	.082		
2 1/2	2 1/8	.105	.076		
3	2 5/8	.091	.067		

<sup>\*</sup> Thin wood panel or single panes of glass

<sup>\*\*</sup> Sealed units; two panes in same opening

# CORRECTION OF HEAT-LOSS FACTORS FOR FIBROUS INSULATION

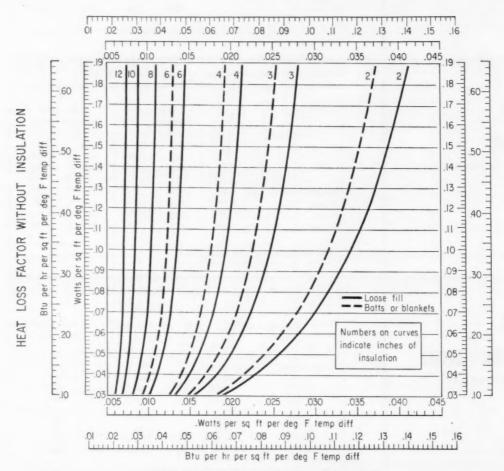
#### FIG. 16. CEILINGS. FLOORS AND WALLS

Insulation completely fills joist or stud space.

#### How to Use Curves:

- Locate "Heat-Loss Factor Without Insulation on left-hand scales.
- Line up ruler with same factor on right-hand scales and mark appropriate curve where it is crossed by the ruler.
- Place ruler vertically through mark and read "Heat-Loss Factor With Insulation" on bottom (or top) scales.

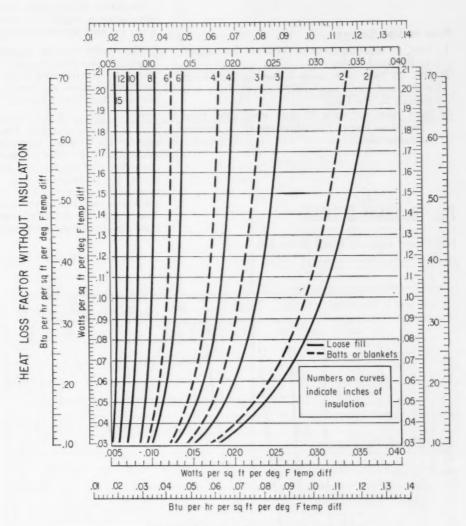
Two sets of curves are given: one for constructions where the insulation only partially fills the space between framing members, leaving a resultant air space at least \(\frac{3}{4}\) in. wide, and the other for constructions where the insulation completely fills the space. The latter curves compensate for the loss of the air space. (For ceilings without a floor on the top side of the joists and for floors without a ceiling on the underside of the joists, Fig. 16 should be used.)



HEAT LOSS FACTOR WITH INSULATION

#### FIG. 17. CEILINGS, FLOORS AND WALLS

Insulation partially fills joist or stud space.



HEAT LOSS FACTOR WITH INSULATION

Curves are based on insulation conductivities of .27 and .30 Btu per hr per sq ft per deg TD for each inch of thickness for batts or blankets and loose fill, respectively. For thicknesses up to 6 in., curves are given for both batts or blankets (dashed curves) and loose fill (solid curves), since both types are available and in common use. Heat-loss scales are given both in terms of watts and Btu's to suit the familiarity of the user.

These curves may also be used for masonry walls faced with study on the inside.

Where air spaces are involved, slight discrepancies may be introduced by applying the same curves to wall, floor and ceiling constructions due to the variation in insulating effect of the air spaces with direction of heat flow. However, such discrepancies will probably have less effect on the overall result than variations introduced during construction,

# CORRECTION OF HEAT-LOSS FACTORS FOR REFLECTIVE INSULATION

#### How to Use Curves:

- Locate "Heat-Loss Factor Without Insulation" on left-hand scales.
- Line up ruler with same factor on right-hand scales and mark appropriate curve where it is crossed by the ruler.
- Place ruler vertically through mark and read "Heat-Loss Factor With Insulation" on bottom (or top) scales,

#### FIG. 18. FRAME CEILINGS

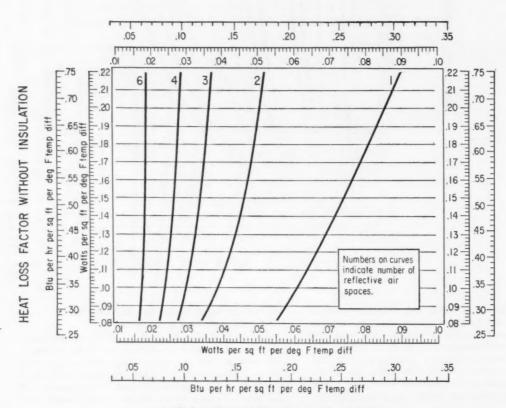
No Floor Above; Heat Flow Up

It is assumed that the reflective material fastened to the tops of ceiling joists is exposed to an unheated attic space; that the material on the underside of the floor joists is exposed to an unheated basement or crawl space.

The effect of floor construction on the overall heat loss factor is slight; therefore only one factor is given for each air-space combination.

The curves of Fig. 18 were plotted from data given in Table 16A, Chapter 9, 1959 Heating Ventilating Air Conditioning Guide. They apply to frame walls or furred-out masonry walls, provided that each air space is at least  $\frac{\pi}{4}$  in. wide.

The insulating effect of reflective air spaces varies with the direction of heat flow, the thickness of the spaces, the overall temperature difference, the emissivity of the reflecting material, and the relative conductance of the building materials bounding the air spaces; therefore no single set of correction factors can hope to account for all variables. However, reasonable variations from the conditions assumed in these charts will change the results probably no more than variations introduced during construction.



HEAT LOSS FACTOR WITH INSULATION

#### FIG. 19. FRAME FLOORS No Ceiling Below; Heat Flow Down

Reflective both sides

Effective emissivity = .05
Temperature difference = 70 F

UNINSULATED

.072-.091 Watt (.24 - .31 Btu)



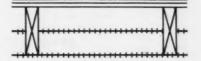
(A) Factors shown represent range for common constructions

I SPACE .024 Watt (.082 Btu)



(B) Sheet of aluminum fastened to underside of joists 2 SPACES

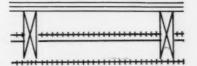
.012 Watt (.041 Btu)



(C) Same as "B", with additional sheet at midpoint of joists

3 SPACES

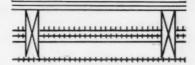
.011 Watt (.037 Btu)



(D) Same as "B", with 2-sheet aluminum-paper assembly centered on joists

4 SPACES

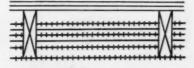
.0098 Watt (.034 Btu)



(E) Same as "D," but with 3-sheet assembly centered in space between joists

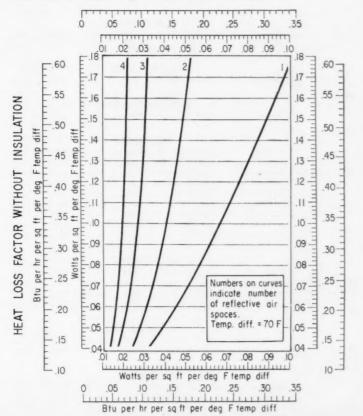
6 SPACES

.0078 Watt (.027 Btu)



(F) Same as "D", but with 5-sheet assembly centered in space between joists

FIG. 20. WALLS Heat Flow Horizontal



HEAT LOSS FACTOR WITH INSULATION

#### ELECTRIC SPACE HEATING DATA (continued)

FIG. 21. CLIMATIC DATA—U.S. CITIES

Asterisks indicate airport stations; others are city office stated average temperature = 65—(degree-days/heating days). Asterisks indicate airport stations; others are city office stations.

			Ave.		Outside				Ave.		Outside
Location	Heating Season	Heating Days	Mean Temp, F	Degree- Days	Design Temp, F	Location	Heating Season	Heating Days	Mean Temp, F	Degree- Days	Design
	ALAI		remp, r	Days	remp, r		IND	IANA	Temp, r	Days	remp,
		BAMA				Evansville*	Oct 4-Jun 15	255	47.9	4360	-
Anniston*	Oct 15-Apr 24	192	50.3	2820	12	Fort Wayne*			40.3		_
Birmingham*	Oct 15-Apr 25	193	50.6	2780	12	Indianapolis	Sept 18-May 30 Oct 2-May 18	255 229		6287	_
Mobile	Nov 2-Apr 1	151	54.9	1529	22	Terre Haute*	Sept 28-May 20	235	42.6	5134 5366	_
Montgomery	Oct 25-Apr 10	168	53.4	1954	18	Terre Haute	Sepi 26-May 20	233	42.2	3300	_
	ARIZ	ONA					10	WA			
Flagstaff*	Aug 12-Jul 5	328	42.1	7525	- 4	Charles City	Sept 10- May 31	264	36.6	7504	-2
Phoenix	Nov 5 -Apr 2	149	55 0	1492	36	'Davenport	Sept 24- May 21	240	39.6	6091	-1
Yuma	Nov 15-Mar 7	113	56.6	951	38	Des Moines Sioux City®	Sept 23- May 23 Sept 16- May 26		39.2	7012	-1
	ARKA	NSAS									
			40 0	3188			KAI	NSAS			
Fort Smith*	Oct 16-Apr 20	187	48 0	2982	6 8	Concordia	Oct 2-May 19	230	41.9	5323	-1
ittle Rock*	Oct 17-Apr 21	10/	47.1	2702	0	Dodge City	Oct 2-May 20	231	43.1	5058	-
						Topeka	Oct 4-May 13	222	42.8	4919	-
	CALIF	ORNIA	4			Wichita*	Oct 7-May 14	220	44.2	4571	-
ureka	*****	365	52.3	4632	32						
resno*	Oct 16-Apr 25	192	51.8	2532	32		KENT	UCKY			
ndependence	Sept 25-May 23	241	49.1	3832	12	Bowling Green*	Oct 4-May 16	225	46.0	4279	
os Angeles	Nov 2-May 10	190	57 . 4	1451	41	Lexington*	Oct 1-May 21	233	43.6	4979	-
acramento	Oct 16-May 14	211	52.7	2600	30	Louisville	Oct 6-May 10	217	45.3	4279	_
an Diego*	Oct 22-Jun 2	224	58.0	1574	43	6001371110	ou o may to	2.17	40.0	44.7	
ian Francisco		365	56.6	3069	37		1011	CIANIA			
ian Jose	Oct 7-Jun 7	244	55.1	2410	38			SIANA			
						New Orleans	Nov 10-Mar 24	135	56.3	1175	
		RADO				Shreveport*	Oct 26-Apr 6	163	52.0	2117	
enver	Sept 15-Jun 7	266	43.7	5673	-12		NA /	AINE			
Grand Junction*	Sept 25-May 23	241	41.0	5796	- 3	Eastport	A/M	365	42.4	8246	
ueblo*	Sept 17-May 31	257	42.8	5709	-14	Portland*	Aug 27-Jun 25	303	39.7	7681	_
	CONNI	CTICL	JT								
Bridgeport*	Sept 19-Jun 5	260	42.3	5896	- 1	B 141		YLAND		4000	
Hartford*	Sept 12-Jun 2	264	41.7	6139	- 2	Baltimore	Sept 8-May 13	248	48.1	4203	
New Haven*	Sept 14-Jun 8	268	42.5	6026	0		MASSA	CHILE	TTC		
	DELA	WADE				Boston*	Sept 17-Jun 5	262	42.9	5791	
Wilmington*	Sept 27-May 19	WARE 235	44.1	4910	0						
	, , , , , ,							HIGAN		0070	
	DISTRICT O	F COL	UMBIA	1		Alpena	Aug 25-Jun 25	305	38.5	8073	-
Washington	Oct 2-May 12	223	45.9	4258	10	Detroit*	Sept 17-Jun 2 Aug 22-Jun 27	259	40.3	6404	
w dishington	Oct 2-May 12	223	43.7	4230	10	Escanaba Grand Haven	Aug 31-Jun 19	310 293	37.1	8657	_
						Grand Rapids	Sept 16-Jun 2	260	40.1	6915	_
	FLO	RIDA				Houghton	Aug 9-Jul 6	332	38.0	8964	_
acksonville	Nov 10-Mar 21	132	56.6	1113	28	Lansing*	Sept 9-Jun 3	268	38.9	6982	_
Aiomi	Dec 4-Mar 13	100	63.3	173	35	Marquette	Aug 24-Jul 1	312	37.7	8529	-
ensacola	Nov 3-Apr 2	151	55.5	1435	24	Sault Ste. Marie*		342	37.3	9475	-
ampa*	Dec 1-Mar 3	93	57.8	674	36						
	GEO	RGIA						ESOT			
Atlanta	Oct 14-Apr 25	194	50.5	2811	2.1	Duluth	Aug 21-Jul 5	319	35.3	9474	-:
Arianta Augusta *	Oct 23-Apr 12	172	52.6	2138	11	Minneapolis*	Sept 11-May 31		35.1	7853	- 2
Macon*	Oct 23-Apr 12	169	52.9	2049	20	Moorhead	Aug 23-Jun 16	298	34.0	9315	-2
avannah*	Oct 28-Apr 9	164	54.6	1710	24	St. Paul*	Sept 11-Jun 1	264	35.4	7804	-2
	15.4	110					MISS	ISSIPP	ı		
		ИНО				Meridian*	Oct 17-Apr14	180	52.0	2333	1
loise*	Sept 9-Jun 12	277	43.7	5890	-10	Vicksburg	Oct 26-Apr 8	165	52.9	2000	1
ewiston*	Sept 13-Jun 8	269	44.6	5483	-12						
ocatello*	Sept 4-Jun 20	290	40.9	6976	-17		MISS	OURI			
						Columbia*	Sept 29-May 17	231	42.9	5113	-
	ILLII	VOIS				Hannibal	Sept 24-May 29	239	43.1	5248	_
Cairo	Oct 11-Apr 29	201	46.3	3756	0	Kansas City*	Oct 5-May 12	220	42.8	4888	-
Chicago*	Sept 21-May 29	251	39.9	6310	-11	St. Louis	Oct 8-May 10	215	44.2	4469	_
Peoria*	Sapt 22-May 27	248	40.5	6087	-13	Springfield*	Oct 1-May 19	231	44.7	4693	_

#### ELECTRIC SPACE HEATING DATA (continued)

Outside design temperature given is that which is likely to recur once every 13 years as the minimum daily mean temperature.

				giş ini		daily mean tem	peraiore.		Aun		Outside
Location	Heating Season	Heating	Ave. Mean	Degree-	Outside   Design	Location	Heating Season	Heating	Ave. Mean	Degree-	Design
		Days	Temp, F	Days	Temp, F			Days	Temp, F	Days	Temp,
	M	ONTAI	NA					INSYLV			
Billings*	Sept 4-Jun 16	286	40.2	7106	-31	Erie	Sept 20-Jun 4	258	41.3	6116	
Havre	Aug 29-Jun 22	298	37.4	8213	-39	Harrisburg*	Sept 22-May 2		43.2	5258	
Helena	Aug 20-Jul 3	318	39.4	8126	-39	Philadelphia	Oct 2-May 17	228	45.2	4523	
Kalispell*	Aug 17-Jul 5	323	40.1	8055	-31	Pittsburgh	Sept 28-May 1		43.4	5048	-
Miles City*	Sept 7-Jun 13	280	37.1	7822	-35	Reading	Sept 26-May 2		43.7	5060	
						Scranton	Sept 15-May 3	0 258	41.6	6047	- 2
		EBRAS					PHO	DE IS	LAND		
Lincoln	Sept 27-May 2		40 :3	5865	-15	Block Island*	Sept 13-Jun 19	280	44.1	5843	7
North Platte*	Sept 15-Jun 1	260	39.8	6546	-15	Providence	Sept 18-Jun 1	257	43.2	5607	1
Omaha*	Sept 24-May 2		39.2	6160	-17	TTOTICONGO		-			
Valentine	Sept 12-Jun 5	267	38.5	. 7075	-21	Charleston	SOU	TH CA	ROLIN	A 1740	22
		NEVAD	A			Charleston	Oct 28 Apr 10		54.3	1769	19
Reno*				4024	2	Columbia	Oct 19-Apr 1	7 181	52.4	2284	17
	Sept 4-Jun 26	296 287	44.6	6036	3		SOU	TH DA	KOTA		
Winnemucca*	Sept 4-Jun 17	28/	42.8	6369	- 9	Huron*	Sept 12-Jun 3	265	29.8	7902	-21
	NEW	HAMP	SHIRE			Pierre	Sept 4-Jun 17	287	39.2	7420	-22
Concord*	Aug 29-Jun 15	291	38.8	7612	-11	Rapid City*	Sept 5-Jun 17	286	26.3	7535	-22
Contorid				7012	-11						-
	NE	W JER	SEY			Chattarana		ENNES!		2204	
Atlantic City	Sept 29-May 3	0 244	45.6	4741	- 8	Chattanooga*	Oct 8-May 4	209	48.8	3384	8
Elizabeth	Sept 20-May 2	4 247	43.5	5302	2	Knoxville*	Oct 8-May 4	209	47.8	3590	5
New Brunswick	Sept 17-May 3	0 256	43.9	5404	4	Memphis Nashville®	Oct 19-Apr 22 Oct 11-May 2	186	48.8	3006 3513	3
Plainfield	Sept 16-Jun 1	259	43.6	5535	4	Mazuville	Oci 11-may 2	204	47.0	3313	•
Somerville	Sept 18-May 2	9 254	43.1	5586	2			TEXAS	,		
Trenton	Sept 25-May 2	1 239	43.8	5068	2	Abilene*	Oct 22-Apr 14	175	49.8	2657	7
	AIF		1100			Amarillo*	Oct 2-May 17	228	45.9	4345	- 2
	NE		CICO			Corpus Christi*	Nov 15-Mar 15	121	56.6	1011	23
Albuquerque*	Oct 3-May 12		45.2	4389	8	Dallas*	Oct 27-Apr 6	162	51.0	2272	8
Roswell*	Oct 8-May 3	208	48.5	3424		El Paso*	Oct 19-Apr 19	183	50.6	2641	20
Santa Fe	Sept 1-Jun 15	287	43.9	6063	3	Fort Worth*	Oct 27-Apr 10	166	50.8	2361	
	MI	W YO	RK			Galveston	Nov 13-Mar 29	137	56.2	1211	23
Albania				4010		Houston	Nov 8-Mar 25	138	55.8	1276	19
Albany	Sept 15-May 2		40.3	6319		Palestine	Oct 30-Apr 7	160	52.6	1980	11
Binghamton*	Aug 30-Jun 16	291	39.1	7537	- 7	San Antonio*	Nov 5-Mar 29	145	54.1	1579	19
Buffalo*	Sept 10-Jun 9	273	40.0	6838							
Ithaca	Sept 4-Jun 9	279	40.9	6719				UTAH			
New York	Sept 28-May 2		44.0	5050		Salt Lake City	Sept 20-May 2	29 252	43.3	5463	- 1
Oswego	Sept 9-Jun 15	280	40.1	6975			V	ERMO	NT		
Rochester*	Sept 9-Jun 6	271	39.7	6863		Burlington*	Sept 3-Jun 10	281	37.0	7865	-17
Syracuse*	Sept 13-Jun 2	263	40.2	6520	-10	Northfield	Aug 8-Jul 1	328	38.6	8719	
	NORT	H CAR	OLINA	1		Horning	Aug o sur i			0/17	-11
Asheville	Sept 29-May 1		47.5		5			VIRGII			
Charlotte*	Oct 9-Apr 30	204	49.3	3205		Cape Henry	Oct 12-May 12		49.5	3307	
Hatteras	Oct 23-May 3	193	52.6	2392		Lynchburg*	Sept 29-May 1		46.6	4153	
Raleigh	Oct 12-May 1	202	49.8	3075		Norfolk	Oct 13-May 7	207	49.9	3119	
Wilmington*	Oct 19-Apr 24	188	52.6	2323		Richmond	Oct 6-May 9	216	47 8	3720	
						Wytheville	Sept 13-Jun 2	263	45.9	5022	
	NOR		KOTA				W	ASHIN	GTON		
Bismarck*	Aug 31-Jun 16	290	33.9	9033		Seattle *	Aug 28-Jul 2	309	50.6	5275	1.
Devils Lake	Aug 27-Jun 22	300	31.9	9940		Spokane*	Aug 31-Jun 27	301	42.2	6852	
Grand Forks	Aug 15-Jun 23	313	33.8	9764	-31	Tacoma	Aug 13-Jul 9	331	50.3		
Williston	Sept 1-Jun 19	292	33.9	9068	-35	Tatoosh Island	**********	. 365	49.3		
		OHIO	)			Walla Walla	Sept 20-May 2		45.6	4848	
Cincinnati	Oct 4-May 14	223	44.7	4532	- 3		WE	ST VIII	GINIA		
Cleveland	Sept 23-May 2		42.0			Elkins*	Sept 12-Jun 6		RGINIA		
Columbus	Sept 27-May 2		42.8					268	43.5		
Dayton*	Sept 25-May 2		42.0			Parkersburg	Sept 30-May 1	8 231	44.4	4750	-
Sandusky	Sept 23-May 2		41.5				1	NISCO	NSIN		
Toledo*	Sept 16-May 3		40.2			Green Bay*	Sept 2-Jun 12	284	35.9	8259	-2
				/-		La Crosse*	Sept 10-May 3		36.0	7650	
	OI	KLAHO	AM			Madison	Sept 13-Jun 3	264	37.3	7300	
Oklahoma City		194	46.9	3519	- 1	Milwaukee	Sept 15-Jun 12		39.4	6944	
										0,44	
B. J.		DREGO						MOAN			
Baker	Aug 25-Jul 4	314	42.4			Cheyenne*	Aug 26-Jun 28	307	40.4		
Portland	Sept 16-Jun 18	276	50.0			Lander*	Aug 29-Jun 22	298	37.1	8303	
Roseburg	Sept 13-Jun 19	280	50.3	4122	19	Yellowstone Par	k	365	38.8	9554	-34



ALCOA ALUMINUM CONDUIT: Lightweight cost, heavyweight performance. Weighs about ½ as much as steel conduit. Cuts easier, threads easier, bends easier. Low first cost. Gives long-term performance because it resists corrosion and staining, is nontoxic, keeps its good appearance for years.

#### 10 TW 600 V

ROME BUILDING WIRE, TYPE TW: Resists heat, chemicals, flame, etc. Synthinol (thermoplastic) insulation gives you exceptional protection against heat, sunlight, oils, acids, alkalies, moisture, fire. Approved for wet or dry installations, up to 60°C. Available with either aluminum or copper conductor.



ROME POWER CABLES for low- and high-voltage jobs. Rome gives you a choice of aluminum or copper conductor, oil-base or butyl-base insulation, two kinds of jacketing. You get exactly the combination you need to resist weather, water, heat, cold, fire, abrasion, chemicals, oils, aging.

New stockpiling program at Rome Cable lets you order 5kv and 15kv single-conductor cables in any length you need, for immediate off-the-shelf delivery.



SERVICE ENTRANCE CABLE: Installs faster, looks neater. You can get Rome's Type SE-U service entrance cables in copper or aluminum. Their light weight, clean exterior and other extra advantages help you make each installation a fast, neat one. Approved for 75°C in dry or wet locations.

BEFORE
YOU
PICK UP
ANOTHER
FOOT
OF WIRE,
CABLE OR
CONDUIT...



can this
QUICK ALCOA GUIDE
help you do a better,
more profitable job?



MULTI-PURPOSE 600-VOLT CABLE for distribution and service entrance. Type RHW resists abrasion, flame, weathering, oil, moisture, most chemicals. Approved for conduit, underground duct and open wire installation, to 75°C. For direct earth burial the same quality of insulation of Type RHW is employed in Type USE.

NONMETALLIC SHEATHED CABLE: Multi-purpose, and resists corrosives. Rome's Flexall, Types UF and NMC, is approved as underground branch circuit and feeder cable. Copper conductor. Solves special problems such as between-building wiring in farm, industrial, residential projects, yard lighting, and interior wiring in barns, dairies, breweries, packing houses, cold storage and ice plants.



NEW STANDARD CONTROL CABLE: New savings, new versatility. Rome's new CT multi-purpose control cable puts you in the driver's seat. Rated for 600 volts—both AC and DC. Pick the number of conductors you need, from 2 to 37, in No. 10 or No. 12 AWG copper. Install it in open air, ducts, conduit, tray, trough, or buried in the ground. Goes in faster, makes neater installations because it is clean, lightweight, and smaller than rubber-insulated cables.



YOURS FREE: Fact-filled bulletins and other information on these products well be sent on request. No obligation, of course. Just contact your distributor, or write to: Rome Cable Division of Alcoa, Dept. 7-91, Rome, New York.



ALCOA ROME CABLE

DIVISION

### COMPANY & TRADE NAMES



Alphabetical listing of company names, trade names and addresses

#### The following listing contains

- 1 Company names, with complete addresses.
- 2 Company trade names, in capital letters for easy reference.
- 3 Other names by which companies may be or may have been known, cross-referenced to present company.

Trade names are listed solely on the basis of information supplied by the manufacturer and are not guaranteed to be registered or the exclusive property of the manufacturer concerned.

A B C—Columbia Cable & Electric Corp A C Transformer Corp 89 Madison St Newark NJ ACF—Atlanta Conduit Fittings Co ACF Industries Inc ACF Electronics Div Riverdale Md Md
ACI—American Colls Co
A C L.—Columbia Cable & Electric Corp
ACW—American Creosote Works Inc
ADT Co—see American District Telegraph Co
A E Industrial Div Aircraft Armaments Inc
6853 Baltimore 4 Md
AECO—American Electric Cable Co
AFCO—Alhambra Foundry Co Ltd
AFSO—AutoFYRStop Co
AG—Farrelloy Co AECD—American Electric Cable Co
AFCO—Almambra Foundry Co Ltd
AFS—AutoFYRStop Co
AG—Farefloy Co
AGA—Breefloy Co
AGA Div Elastic Stop Nut Corp—see Elastic Stop Nut
Corp of America
A H—Arrow-Hart & Hegeman Electric Co
AJ F Industries Inc—see Atlantic Transformer Div
A-MAL-GAM—Smith Welding Equipment Corp
AMCO—American Solder & Flux Co
AMP Inc. Elsewhower Bivd Harrisburg Pa
AL Audio Engineers—see Of Sterie Electric Corp
AOW Corp 450 H Ninth St. Elwood Ind
A-P Controls Corp—see Controls Co of America
APAC—Kessbey & Mattison Co
APCO—Aurora Pump Div New York Air Brake Co
APCO—Aurora Pump Div New York Air Brake Co
APCO—Aurora Pump Div New York Air Brake Co
APCO—Automatic Switch Co
AFCO—Automatic Switch Co
ASMC—Farrelloy Co
ATI—Alexander-Tagg Industries Inc
A W H Co—see Haydon (A W) Co
AZ—Plastic Wire & Cable Corp
ABELCOR—O'Brien Electric Corp
ABCLASE Natura Corp
AbCItte Lighting Div Jones Metal Products Co West
Lafayette Okio
ABR-A-SAW—Collins Machinery Corp
Abrams Instrument Corp 606 E Shiawasee St Lansing
Mich Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa
ABSORB-A-SHOCK—Federal Shock Mount Corp
ACCOLITE—Accurate Insulated Wire Corp
ACCOLITE—Accurate Insulated Wire Corp
ACCOPRINE—Accurate Insulated Wire Corp
ACCTHERM—Accurate Insulated Wire Corp
ACCMIRE—Accurate Insulated Wire Corp
ACCWIRE—Accurate Insulated Wire Corp
ACE—Armature Coil Equipment Inc
ACCMIRE—Accurate Insulated Wire Corp
ACE—Peer Inc
ACE—Armature Coil Equipment Inc
ACE—Armature Coil Equipment Inc
ACE—Armature Coil Equipment Inc
ACE—Armature Coil Equipment Inc
ACE—Peer Inc
ACE—Peer Inc
ACE—Peer Inc
ACHEOMATIC—Keystone Electric Mfg Co
ACID-CAUSTIC BAND—Wilbur & Williams Co
ACHROMATIC—Keystone Electric Mfg Co
ACID-CAUSTIC BAND—Wilbur & Williams Co
Ackerman-Johnson Co 625 W Jackson Blvd Chicago
6 III ACID-CAUSTIC BAND—Wilbur & Williams Co Ackerman-Johnson Co 6.25 W Jackson Blvd Chicago 6 III ACME—Co-operative Utilities Co Inc ACME—McCaffrey Mfg & Supply Co Acme Electric Copp 45 Water St Cuba NY Acme Electric Copp 45 Water St Cuba NY Acme Electric Heating Co—see Acme Electric Heating Corp. Corp Acme Electric Heating Corp 99 Reading St Boston 19 Mass 19 Mass Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY Industries Inc 620 N Mechanic St Jackson Acme Mich Lighting & Mfg Co 949 E 31 St Los Angeles Calif Acme 11 11 Calif
Acme Lite Products Co Inc Congers NY
Acme Mfg & Gasket Co 738 N 41 St Phila 4 Pa
Acme Steel Co 135th St & Perry Ave Chicago 2 Acme Welded Pipe & Coil Co—see Acme Industries Inc Acme Wire Co Utility Products Div 1255 Dixwell Ave New Haven Conn Acorn Insulated Wire Co 36 Freeman St Pawtucket RI RI Acoustica Associates Inc 10400 Aviation Blvd Los Angeles 45 Calif ACOUSTILITE—Neo-Ray Products Inc Acra Electric Corp 9901 Pacific Ave Franklin Park ACTO Electric Corp 9901 Pacific Ave Franklin Park III

ACTA Industrial Electric Co—see Acra Electric Corp

ACRAWATT—Acra Electric Corp

ACRI-LUMINUS—Luminous Ceilings Inc

ACRO-ETCH—Acromark Co

ACRO-ETCH—Acromark Co

ACRO-ETCH—Acro Switch Div

ACRO MAGNETIC—Acro Welder Mfg Co

ACRO SWITCH—Acro Switch Div

Acro Mig Co—see Acro Switch Div

Acro Mig Co—see Acro Switch Div

Acro Mig Witch Div —see Acro Switch Div

Acro Mig Co—see Acro Switch Div

Acro Switch Div Robertshaw-Fulton Controls Co

2040 E Main St Columbus 16 Ohio

Acro Welder Mfg Co 1719 W St Paul Ave Mil
waukee 3 Wis

ACROMATIC—Acro Welder Mfg Co

ACROM

ADALOY-Adams Engineering Co Adam (Frank) Electric Co 3647 Windsor Pl St ADALOY—Adams Engineering Co
Adam (Frank) Electric Co 3647 Windsor PI St
Louis Mo
Adams Engineering Co 31711 Solon Rd Solon Ohio
ADAPT-A-LITE—Cable Electric Products Inc
ADAPT-A-LITE—Cable Electric Products Inc
ADAPT-A-LITE—Cable Electric Products Inc
ADAPT-A-LITE—MiroFleetor Co Inc
ADAPTALITE—MiroFleetor Co Inc
ADA-A-BREAKER—Westinghouse Electric Corp
ADD-A-A-BREAKER—Westinghouse Electric Corp
ADD-A-PHASE—System Analyzer Corp
ADD-A-PHASE—System Analyzer Corp
ADD-A-PHASE—System Analyzer Corp
ADD-A-SHELF—Alpha Wire Corp
ADD-A-SHELF—Alpha Wire Corp
ADD-A-UNIT—Blonder-Tongue Laboratories Inc
ADD-A-SINIT—Blonder-Tongue Laboratories Inc
ADD-A-SINIT—Blonder-Tongue Laboratories Inc
ADD-A-SINIT—Blonder-Tongue Laboratories Corp
ADJUSCO-LOC—Adjustable Fixture Co
ADJUST-A-VOLT—Standard Electrical Products Co
ADJUST-A-VOLT—Standard Electrical Products Co
ADJUST-A-UNITES—Litecraft Mig Co
ADJUST-A-LITES—Litecraft Mig Co
ADJUST-A-LITES—Litecraft Mig Co
ADJUST-A-LITES—Litecraft Mig Co
ADJUST-A-PULLTES—Uniteraft Mig Co
ADJUST-A-PULLTES—Wester Instruments Corp
ADJUST-A-DST Mig Co 908 St Clair St Akron 7
Ohio Ohio
Ohio
ADJUSTA-PULLEY—Watteredge Co
Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis
ADJUSTAT—Smith-Gates Corp
ADJUSTO-DECK—Haertel (Walter) Co
ADJUSTO-SLIDE—American Pulley Co
ADJUSTOHM—Ward Leonard Electric Co
Adre Co 8980 W Hawthorne Lane Hales Corners 3
Wis Wis
ADVAN-GUARD—Advance Transformer Co
ADVANCE—Beaver-Advance Corp
ADVANCE—Elgin National Watch Co
Advance Transformer Co 2950 N Western Ave
Chicago 18 II
ADVENTURER—York Div Chicago 18 III

ADVENTURER—York Div

Aemco Inc 10 State St Mankato Minn

AERO—American District Telegraph Co

AERO FAN—Emerson-Pryne Co

AERO FAN—Emerson-Pryne Co

Aero Instrument Co 11423 Vanowen St North Holly
wood Calif Aero Jiana Wood Calif AERO-MAGMETTE—Heinemann Electric Co Aero-Motive Mfg Co 1803 Alcott St Kalamazoo 24 AERO-MAGNETTE—Heinemann Electric Los Michaero-Motive Mfg Co 1803 Alcott St Kalamazoo 24 Mich AERODYNE—Jeffrey Mfg Co Aeroii Products Co Inc 69 Wesley St South Hackensack NJ Aerolux Electric Lamp Corp—see Aerolux Lights Corp Aeroiux Elights Corp 653 11th Ave NY 36 NY AEROLYTE—Lightolier Inc AEROMAC—Seely Instrument Co Inc Aerovent Fan Co Inc Ash and Block Sts Piqua Ohio Aetra Motor Products Co—see Pollak (Joseph) Corp Afco Life Corp 1378 N Wolcott Chicago 22 III AFTER-GLOW—Perfectite Co AGASTAT—Elastic Stop Nut Corp of America AGASWITCH—Elastic Stop Nut Corp of America AGASTAT—Guth (Edwin F) Co Ahlberg Bearing Co 3025 W 4th St Chicago 32 III AIM BRAND—Acme Steel Co Ainsworth Lighting Inc 38-10 Twenty-Ninth St LIC 1 NY AIR CONTROL—Mastings Air Conditioning Co Inc Air Controls Inc 2310 Superior Ave Cleveland 14 Ohio AIR-FLOW-Matthews Electric Heater Mfg Co Air-Hydraulics of Indiana--see Industrial Electric AIN-PLUW—Matthews Electric Heater Mfg Co Air-Hydraulics of Indiana—see Industrial Electric Switches of Indiana AIR KING—Berns Air King Corp Air-Marine Motors Inc 369 Bay View Ave Amity-ville NY ville NY
AIR MOVER—Mine Safety Appliances Co
Air & Refrigeration Corp 439 Madison Ave New York
NY NY
AIR-ROL—Rollway Bearing Co Inc
AIRBOY—Mitchell Industries Inc
Aircraft Marine Products Inc—see AMP Inc
Aircraft Specialties Inc 415 Howard St Lapeer Mich
AIRE-RECTIFIER—Larco Inc
Airfan Engineering Co 7401 Telegraph Rd Los Angeles
22 Calif
AIRI LINE Special He Mift Co. AIRTAIN CRAINEAST CO.

22 Calif
22 Calif
22 Calif
AIRLUX—Sun-Lite Mfg Co
AIRMASTER—Haertel (Walter) Co.
AIRMAPELER—Ammerman Co Inc
AIRSEAL—Kearney (James R) Corp
Airserco Mfg Co Inc 435 Melwood St Pittsburgh
12 Pa AIRSEAL—Kearney (James NJ Gorp
Airserco Mfg Co Inc 435 Melwood St Pittsburgh
13 Pa
AIRSPREAD—Hunter Div
AIPSWEEP.—Progress Mfg Co Inc
Airtemp Div Chrysler Corp 1600 Webster St Dayton
17 Ohio
AIRTROL—Reeves Pulley Div Reliance Electric &
Engineering Co
AIRXPELER—Ammerman Co Inc
Airken-Boad Inc 2802 Wollmer St Manitowac Wis Aitken-Reed Inc 2802 Wollmer St Manitowac Wis AJAX—Ceilheat Inc AJAX-Security Insert Co AJAX—Security Insert Co
AJAX,—Shewin-Williams Co
AJAX,—ANKERSEN—Ajax Electric Co
AJAX,—ANKERSEN—Ajax Electric Co
Ajax Magnethermic Corp
AJAXOMATIC—Ajax Magnethermic Corp
ADJUSTO-BRAKE—Dynamic Div
Eaton Mfg Co
AJUSTO-SPEDE—Dynamic Div
Caton Mfg Co
AKRA-OHM—Shallcross Mfg Co
AKRA-OHM—Shallcross Mfg Co
AJAXOMATIC—AJax Magnethermic Div
AJAXOMATIC—AJAX Sevenour Inc ALABAX—Pass & Seymour Inc ALABDIN—New England Carbide Tool Co Inc ALASKAN—National Engineering & Mfg Co ALBA-LITE—Corning Glass Works

ALBANY—Cooks Sons (Adam) Inc Albertson & Co Inc 2999 Floyd Blvd Sloux City ALBANY—Cooks Sons (Adam) Inc
Albertson & Co Inc 2999 Floyd Blvd Sioux City
Iowa
ALCOA—Aluminum Co of America
Alcor Mfg Co 1140 S Sewenth St De Kalb III
ALDUTI—S & C Electric Co
ALECTRAL—General Cable Co
ALECTRAL—General Cable Co
ALEXALL—American Biltrite Rubber Co
Alexander-Tagg Industries Inc Jacksonville Road at
Summit Ave Hatboro Pa
Alexander-Towle Industries—see Alexander-Tagg IndusTries Inc
ALGO—Aluburn Mfg Co
Albambra Foundry Co Ltd 1147 Meridian Ave
Alhambra Foundry Go Ltd 1147 Meridian Ave
Alhambra Foundry Go Ltd 1147 Meridian Ave
AllaRCO—Aluburn Mfg Co
AllsCO—Ballis (Louis) Co
All Co—see Alkco Mfg Co
AllsCO—Ballis (Louis) Co
All Co—see Alkco Mfg Co 4242 N Lincoln Ave Chicago 18 III
ALL-MEDIA—Fluorescent Fixtures of California
All-Brite Light Co 400 S 12 St Reading Pa
ALL-MOTOR—Falk Corp
ALL-MOTOR—Falk Corp
ALL-MOTOR—Falk Corp
ALL-SQUARE—Guth (Edwin F) Co
All-State Welding Alloys Co Inc
White Plains NY
All-Steel Equipment Inc
ALL-VISION—Mine Safety Appliances Co
ALL-WEATHER—Mine Safety Appliance Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis Allen Cooler & Ventilator Inc 704 Woodward St. Rochester Mich Allen Electric and Equipment Co 2101-2117 N Pitcher St. Kalamazoo Mich Allen Iron & Steel Co P 0 Box 550 Norristown Pallen-Stevens Conduit Fittings Corp 33-53 62nd St. Woodside 77 NJ Woodside Mig Co Inc Lake Park Blvd Alliance Ohio Allied Industries Inc P O Box 119 Ogaliala Adlied Mighthing Protection—See Security Mfg & Contracting Co Allied Mfg & Sales Co 3101 W Grand Ave Chicago 22 III ed Metal Stamping Co 1475 S 6th St Camden 4 Alli NJ
Allied Precision Industries 425 Stevens St (P 0 Box 149) Geneva III
ALLIGATOR—Porcelain Products Inc
ALLIGATOR JAW—Anderson (Albert & JM) Mfg Co
Allis (Louis) Co 427 E Stewart St Milwaukee 1 Wis
Allis-Chalmers Mfg Co 6930 S 70th St Milwaukee 1 Allis-Chalmers Mfg Co 6930 S 70th St Milwaukee 1
Wis
ALLISPEDE—Allis (Louis) Co
Allimetal Engineering Inc 1003 S Date Ave Alhambra
Calif
ALMAG—Alpha Wire Corp
Almo Mfg Co Inc 618 Jersey Ave Union Beach NJ
ALNICO—Crucible Steel Co of America
ALPHA—Trombetta Solenoid Corp
Alpha Metals Inc 60C Water St Jersey City 4
NJ
NJ
NJ
Wire Corp 200 Varick St New York 14 NY Alpha Metals Inc 60C Water St Jersey City 4
NJ
Alpha Wire Corp 200 Varick St New York 14 NY
Alphaduct Wire & Cable Co 25 Van Dyke Ave
(P.O. Box 709) New Brunswick NJ
ALPHLEX—Alpha Wire Corp
ALTEMP—Alpha Wire Corp
ALTIMATIC—Air-Marine Motors Inc
ALUM-LEX—Auburn Mfg Co
ALUMALLOY—Killark Electric Mfg Co
ALUMALLOY—Killark Electric Mfg Co
ALUMALLOY—Killark Electric Mfg Co
ALUMALLOY—Sillark Electric Mfg Co
ALUMALLOY—Sillark Electric Mfg Co
ALUMALDE—Globe Lighting Products Inc
ALUMINITET—Round (David) & Son Inc
ALUMINITET—Apperical Steel Co
Alwalt Mfg Co Inc 1706 Lapham Dr (P O Box 1171)
Modesto Calif
AMADCO—Associated Manufacturers & Distributors
Corp
AMAIRCFII—American Electric Cable Co MODGESTO —Asioriated Manufacturers & Distributors Cop AMARICELL—American Electric Cable Co AMARINE—American Steel & Wire Div AMAZALOY—All-State Welding Alloys Co Inc AMCODRUMS—Art Metal Lighting Div AMER X—American Insulated Wire Corp AMREAP—American Electric Cable Co AMERESTOS—American Steel & Wire Div United States Steel Corp AMERCORD—American Steel & Wire Div United States Steel Corp AMERCORD—American Steel & Wire Div AMERCORD—American Steel & Wire Div AMERCORD—American Steel & Wire Div AMERCORD—American Flexible Conduit Co Inc AMERICAN BEAUTY—American Electrical Heater Co American Biltrite Rubber Co Boston Woven Hose & Rubber Div 29 Hampshire St Cambridge Mass American Blower Corp—see American—Standard American Blower Corp—see American—Standard Merican—Standard Industrial Division American Coach & Body Co—see McCabe-Powers Body Co American Coils Co Route 524—Lakewood Rd Farmingdale NJ

American Electric Cable Co 181 Appleton St Holyoke Mass American Electric Motors Inc-see American Elec-American Electric Motors Inc—see American Electronics Inc
American Electric Switch Corp—see American Electric Switch Div
American Electric Switch Div Clark Controller Co 1146 E 152 St Cleveland 10 Ohio
American Electrical Heater Co 6110 Cass Ave Detroit 2 Mich
American Electronic Mfg Inc—see American Electronics American Electronic Wirg Inc.—see American Electronics Inc
American Electronics Inc 655 W Washington Blvd
Los Angeles 15 Calif
American Engineering Co—see A E Industrial Div
Aircraft Armaments Inc
American Flexible Conduit Co Inc 969 Shawmut Ave
New Bedford Mass
American Floor Machine Co 518 S St Clair St
Toledo 3 Ohio
American Gas Accumulator Co—see Elastic Stop Nut
Corp of America
American Hard Rubber Co Ace Rd Butler NJ
American Insulated Wire Corp 36 Freeman St
Pawtucket R1
American Louver Co 5308 N Elston Ave Chicago 30
III Inc III American Lumber & Treating Co-see Koppers Co Inc American Metal Hose Div-see Anaconda Metal Hose rican Metal Moulding Co 146 Coit St Irvington American Pipe Bending Machine Co Inc Poultney Vt American Pipe Tool Co 4856 W Kinzie St Chicago 44 Ill American Products Mfg Co Inc 8127-33 Oleander St New Orleans 18 La American Pulley Co 4200 Wissahickon Ave Phila 29 Pa Amer. NV American Rectifier Corp 95 Lafayette St NY 13 NY
American Sealants Co 705 N Mountain Rd Hartford 11 Conn
American Sentry Inc 84 Bethlehem Pike Philadelphia 18 Pa
American Silver Co Inc Industrial Div 36-07 Prince
St Flushing 54 NY
American Solder & Flux Co 19th & Willard Sts
Phila 40 Pa
American-Standard Controls Div 5900 Trumbull Ave
Detroit 8 Mich
American-Standard Industrial Div Detroit 32 Mich
American Steel & Iron Works 5801 S Lowe Ave
Chicago 21 Ill
American Steel & Wire Div United States Steel Corp
Rockefeller Bidg Cleveland 13 Ohio
American Super-Temperature Wires Inc Winooski Vt
American Tool & Engineering 2105 Moore St San
Diego Calif
American Transom Co—see Security Insert Co
American Yacuum Co—see Security Insert Co
American Vacuum Co—see Security Insert Co erican Rectifier Corp 95 Lafayette St NY 13 American Vacuum Co BIOU North Ridgeway Skokie

III AMERICANA—Project Fixture Mfg Corp
AMERICAN—American Steel & Wire Div United States

Steel Corp
AMERPASTIC—American Electric Cable Co
AMERPRENE—American Insulated Wire Corp
AMERPRENE—Leviton Mfg Co Inc
AMERSHIELD—American Insulated Wire Corp
AMERTROL—American Insulated Wire Corp
AMERTROL—American Insulated Wire Corp
AMERY—American Insulated Wire Co Amplex Div Chrysler Corp P 0 Box 2718 Detroit 31 Mich Amplex Mfg Co-see Amplex Div AMPLI-SPEED-Electric Machinery Mfg Co AMPLICALL—Rauland-Borg Corp
AMPLITROL—Thermolyne Corp
Amprobe Instrument Corp 630 Merrick Rd Lynbrook NY AMPROBE JR-Amprobe Instrument Corp Anaconda Metal Hose Div Anaconda American Brass Co P 0 Box 791 Waterbury 20 Conn Anaconda Wire & Cable Co 25 Broadway New York 4 CO P O Box 791 Waterbury 20 Conn Anaconda Wire & Cable Co 25 Broadway New York 4 NY ANACONDALOY—Anaconda Wire & Cable Co ANALAC—Anaconda Wire & Cable Co Anchor Mfg Co P O Box 959 Manchester NH Anchor Metal Co Inc 966 Meeker Ave Brooklyn 22 Anchor Packing Co 401 N Broad St Philadelphia 8 Pa ANDER-CRIMP—Anderson Electric Corp Anderson Brass Works—see Anderson Electric Corp Anderson (A F) Iron Works—see American Steel & Iron Works Works Anderson (Albert & JM) Mfg Co 289 A St Boston 10 Mass

American Concrete Corp 5092 N Kimberly Ave Chicago 30 III American Coolair Corp 3604 Mayflower St (P 0 Box 2300) Jacksonville 3 Fla American Creosote Works Inc 1305 Dublin St (Box 4008) New Orleans 18 La American Crossarm and Conduit Co 7726 Sheridan Rd Chicago 26 III Conduit Co 1755 Sixth Ave NY 13 NY American Electric Cable Co. 181 Appleton St Holywke

Anderson Electric Corp P 0 Drawer 2151 Birmingham 1 Ala
ANHYDREX—Simplex Wire & Cable Co
ANHYDROPRENE—Simplex Wire & Cable Co
ANKOPRENE—Anchor Packing Co
ANKORITE—Anchor Packing Co
ANKORITE—Anchor Wire & Cable Co
ANKOSEAL—Ansonia Wire & Cable Co
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Annis (R B) CD 1101 N Delaware St Indianapons 2 Ind ANNOUNCEMAT—Recora Co Inc ANNOUNCETTE—Edwards Co Inc ANNOUNCETTE—Edwards Co Inc ANOZINC—Metal & Thermit Corp Ansonia Electrical Co—see Ansonia Wire & Cable Co Ansonia Wire & Cable Co 111 Martin St Ashton RI ANTENSIFIER—Blonder-Tongue Laboratories Inc Anthony (F M) Co 773 University Ave Berkeley 10 Calif ANTI-ARC—Palmer Electric & Mfg Co ANTI-KORODE—Arsco Mfg & Sales Corp Apex Bolt Froducts Co 452-458 N Claremont Ave Chicago 12 III Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY Apollo Lighting Fixture Co Inc 162 W Third St Mt Apollo Lighting Fixture Co Inc 162 W Init'd St Mt Vernon NY Appleton Electric Co 1701-59 Wellington Ave Chi-cago 13 III Appleton Rubber Co Inc 57 Cornwall St Boston 30 Mass Appleton Rubber Co Inc. 57 Cornwall St. Boston 50 Mass AQUALIX—Luxor Lighting Products Inc. AQUASORB—Turco Products Inc. AQUASORB—Turco Products Inc. AQUASORB—Turco Products Inc. ARC-ESCENT—Luxor Lighting Products Inc. Arco Mg Co 1701 13th Ave North (Box 817) Grand Forks ND. ARCO WAND—American Vacuum Co. ARCO WAND—American Vacuum Co
ARCTROL—Mullenbach Div
AREALENS—Art Metal Co
AREALUX—Lighting Products Inc
Arex Co 612 N Michigan Ave Chicago 11 III
AREX-AUSTOR—Arex Co
Argo Sales Co—see Argo Products Co
Argo Products Co 3500 Goodfellow St Louis 20 N
Aries Laboratories Inc 45-33 Davis St Long Isla
CCIV 1 NY City 1 NY
ARIN—Arex Co
ARISTOCRAT—Ceilheat Inc
ARISTOLITE—Guth (Edwin F) Co
ARISTOLITE—Guth (Edwin F) Co
ARITEMP—Aries Laboratories Inc
Arjac Products Inc 55-59 Halstead St Rochester 10
NY NY Ark-les Switch Corp 51 Water St Watertown Mass ARK-TROL—Crouse-Hinds Co ARKLESS—Economy Fuse Div ARKTITE—Crouse-Hinds Co ARKLESS—Economy Fuse Div
ARKITIE—Crouse-Hinds Co
Arlavox Mfg Co—Radionic Transformer Co
ARMAROTE—Hatfield Wire & Cable Div Continental
Copper & Steel Indus Inc
Armature Coll Equipment Inc 2605 Vega Ave Cleveland 13 Ohio
ARMATURO—Johns-Manville
ARMITE—Spaulding Fibre Co Inc
ARMOLOK—Phelps Dodge Copper Products Corp
ARMOR-GRIP—Preformed Line Products Co
Armstrong-Bray & Co 5266 Northwest Highway Chlcago 30 III
Armstrong Bros Tool Co 5200 W Armstrong Ave
Chicago 46 III
ARRO-CORE—Arro Expansion Bolt Co
Arro Expansion Bolt Co
Arro Expansion Bolt Co
Arro Expansion Bolt Co
Arro Expansion Bolt Co
Arrolet Corp
ARROVAL—Arrolet Corp
ARROVAL—Arrolet Corp
ARROVAL—Arrolet Corp
ARROVAL—Arrolet Corp
ARROVAL—Arrolet Corp
Arrow Conduit & Fittings Corp
Dos-20 180th St
Jamaica 33 NY
Arrow Electric—See Arrow-Hart & Hegeman Electric
Co
Arrow Conduit & Fittings Corp
Dos-20 180th St
Jamaica 33 NY
Arrow Fastener Co Inc 1 Junius St
Brooklyn 12 NY Co Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn Arrow Lamps Inc 1270 Broadway New York 1 NY Arsco Mfg & Sales Corp 438 Tenth Ave New York Art Metal Co—see Art Metal Lighting Div Art Metal Lighting Div Wakefield Corp 1814 E 40 St Cleveland 3 Ohio Art Specialty Co 3720 N Milwaukee Ave Chicago 41 III III

Artcraft Fluorescent Corp—see Artcraft Lighting Co Inc Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY
ARTIC—Yardney Electric Corp
Artisite Lamp Mfg Co Inc 109 Eighth St Passaic NJ
Artolier Corp 141 Lanza Ave Garfield NJ
Artos Engineering Co 2757 S 28 St Milwaukee 46 Wis Arvin Industries Inc Columbus ASARCOLO—Federated Metals Div ASBESTICA—Johns-Manville ASBESTITE—Burndy Corp ASBESTOMENT—Johns-Manville ASBESTON—United States Rubber Co ASBESTOS EBONY—Johns-Manville ASCOT—Pollak Luminescent Corp Asheville-Schoonmaker Mica Co 900 Jefferson Ave Newport News Va Assembly Products Inc Chesterland 31 Ohio Associated American Trading Divasee Associated American Trading Divasee Associated American Winding Machines Inc. 750 St. Ann's Ave. New York 56 NY. Associated Engineering Corp. 65 Kent. St. Brookline. 46 Mass.

Associated Manufacturers & Distributors Corp 5015 S E Haig St Portland 6 Ore Associated Research Inc 3789 W Belmont Ave Chicago 18 III ASTRA-LITE—Metalcraft Products Co Inc ATCOTRAN—Automatic Timing & Controls Inc ATCOTROL—Automatic Timing & Controls Inc ATCOTROL—Automatic Timing & Controls Inc ATCOTROLIC—Automatic Timing & Controls Inc ATCOTROLIC—Automatic Timing & Controls Inc Athol Machine & Foundry Co 82 South St Athol Mass Atkomatic Valve Co Inc 545 W Abbott St Indiana-Atkomatic Valve Co Inc 545 W Abbott St Indianapolis Ind
Atlantic Conduit Fittings Co 450 Western Ave Boston Mass
Atlantic Engravers Inc 52 Ocean Ave Amityville NY
Atlantic Transformer Co 8330 Hegerman St Philadelphia 36 Pa
Atlantic Transformer Corp—see Atlantic Transformer
Dly
Atlantic Transformer Div New London Instrument Co Inc
30 Hymes Ave Groton Conn Atlantic Transformer Div New London Instrument Co Inc 30 Hynes Ave Groton Conn ATLAS—SKF Industries Inc ATLAS—Tevo Insulated Wire ATLAS—Tevo Insulated Wire ATLAS—Tevo Insulated Wire ATLAS—ARE—Atlas Tool & Mfg Co Atlas Asbestos Co 423 Walnut St North Wales Pa Atlas Electric Products Co 319 Ten Eyck St Brooklyn 6 NY Atlas Metal Industries 259 W 23 St Hialeah Fla Atlas Mineral Products Co Mertztown Pa Atlas Merehad Door Co Mill St at Reading Railroad Quakertown Pa Atlas Sheck Metal Works—see Atlas Metal Industries Atlas Tack Corp Pleasant & South Sts Fairhaven Mass Atlas Sheet Metal Works—see atlas Mass Atlas Tack Corp Pleasant & South Sts Fairhaven Mass Atlas Tool and Mfg Co 5147 Natural Bridge Ave St Louis 15 Mo Atlee Corp 47 Prospect St Woburn Mass Atlight Lighting Equipment—see Atlas Electric Products Co ATMO—Kidde Ultrasonic & Detection Alarms Div AUBESTON—Auburn Mfg Co O Auburn Mfg Co Pease Ave Stack St Middletown Conn AUDIOSPHERE—Simpson (Mark) Mfg Co Inc AUDIOTONE—Peschel Electronics Inc AUDIOTONE—Peschel Electronics Inc AURORA—Metalcraft Products Co Inc Aurora Pump Co—Aurora Pump Div New York Air Brake Co 54 Loucks St Aurora III

Austin (M B) Co—see Stonco Electric Products Co AUT-C-DOR—Richards-Wilcox Mfg Co AUTEX—Williard Storage Battery Vio Electric Storage Battery Vio Electric Co Inc 34-20 45th St LIC 1 NY Battery Co
Auth Electric Co Inc 34-20 45th St LIC 1 NY
Auth Electrical Specialty Co Inc—see Auth Electric
Co Inc AUTHOTONE—Auth Electric Co Inc
Auto Arc-Weld Mfg Co 9615 Meech Ave Cleveland 5
Ohio
AUTO-BIN-DICATOR—Bin-Dicator Co
AUTO-BIN-DICATOR—Bin-Dicator Co
AUTO-BIN-DICA—Cound (David) & Son Inc
AUTO-BRIDGE—Industrial Instruments Inc
AUTO-DICA—Cound (S H) Co Inc
AUTO-DICA—Cound (S H) Co Inc
AUTOCA—Automatic Control Co
AUTODYNE—Westinghouse Electric Corp
AUTOCAP—Hubbard & Co
AUTOCAP—Hubbard & Co
AUTOCAP—Hubbard & Co
AUTOCAP—Hubbard & Co
Automatic Control Co 995 University Ave St Paul 4
Minn
Automatic Devices—see Automatic Devices Div
American Machine & Metals Inc
Automatic Electric Go Northlake III
Automatic Products Co—see Controls Co of America
Automatic Switch Co 50-56 Hanover Rd Florham
Pk NJ
Automatic Temperature Control Co—see Automatic Timing & Controls Inc
Automatic Transportation Co 101 W 87th St Chicago 20 III
Automatic Transportation Co 101 W 87th St Chicago 20 III
Automatic Vulcanizers Corp 16 Hudson St New
York 13 NY
Automatic Transportation Co 101 W 87th St Chicago 20 III
Automatic North Machine Mind Products Inc 303 Max Roy St Houston 24 Tex
AUTOMATOR—Marathon Electric Mfg Corp
AUTOMATOR—Marathon Electric Mfg Corp
AUTOSPEED—Stromberg Div General Time Corp
AUTOTAK—Howell Instruments Inc
AUTOTEMP—Howell Instruments Inc
AUTOTAM—Marathon Electric Corp
AUTOTAM—Marathon Electric Corp
AUTOSPEED—Stromberg Div General Time Corp
AUTOSPEED—Stromberg Div General Time Corp
AUTOSPEED—Stromberg Div General Time Corp
AUTOTAK—Howell Instruments Inc
AUTOTAM—Howell Instruments Inc
AUTOTAM—Howell Instruments Inc
AUTOTAM—Michael Industries Inc AUTHOTONE—Auth Electric Co Inc Auto Arc-Weld Mfg Co 9615 Meech Ave Cleveland 5 AXIFLO—Westinghouse Electric Corp AXIVANE—Joy Mfg Co

B

B-LINE—Black (M) Mfg Co BAC—Ettco Wire & Cable Corp BBB—Becker Bros Carbon Co B & C Metal Stamping Co P O Box 2506 Atlanta Ga

BD-Beede Electrical Instrument Co Inc Mich
BABY-COM—Fanon Electronic Industries Inc
BABY COMBO—Mole-Richardson Co
BABY DIGGER—Cleweland Trencher Co
BABY SENT—Buffalo Forge Co
BADGER—Reliance Time Controls Inc
Badger Die Casting Corp 201 W Oklahoma Ave Milwauker 7 Wis
Bahnson Co 1001 S Marshall St Winston-Salem
NC Bailey Meter Co 1050 Ivanhoe Rd Cleveland 10 Baker-Barkon Co 1335 S W Morrison St Portland Baker-Perkins Inc Saginaw Mich Baker-Roos Inc 602 W McCarty St Indianapolis 6 Isid
BAKER SCAFFOLD—Baker-Roos Inc
BALANCE—Self-Lifting Piano Truck Co
BALCO—Driver (Wilbur B) Co
Balco—Driver (Wilbur B) Co
Baldor Electric Co 4353 Duncan Ave St Louis 10 BALL-RITE-Cummins Portable Tool Div John Oster Mfg Co BALLOLITE—Line Material Industries Ballymore Co Lincoln & Garfield Aves West Chester Pa
BAND-ROD—Sherman (HB) Mfg Co
BANNER-AIRE—Argo Products Co
BANTAM—American Rectifer Corp
BANTAM—Small Motors Inc
BANTAM—Sin-Dicator Co
Bar-Brook Mfg Co Inc 6133-35 Linwood Ave Shreveport La Barber-Colman Co P O Drawer 99 Rockford Barber Electric Mfg Co Inc .30 Chestnut St Barber Electric Mfg CO INE 30 Vincental Ave Aurora III Borbour Officence Co 400 N Highland Ave Aurora III Borbour (J E) Co—see Ludlow Mfg & Sales Co Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio Barkon-Frink Tube Lighting Corp—see Frink Corp Barksdale Valves 5125 Alcoa Ave Los Angeles 58 N Attie-Barksdale Valves 512.5 Alcoa Ave Los Angeles 58
Calif
Barry Controls Inc—see Barry Wright Corp
Barry Controls Inc—see Barry Wright Corp
Barry Controls Inc—see Barry Wright Corp
Barry Wright Corp Barry Controls Eastern Div 700
Pleasant St Watertown 72 Mass
BARRYMOUNT—Barry Wright Corp
BARTRAP—Burndy Corp
BARTRAP—Burndy Corp
BARTHAP—Burndy Corp
BARTHAP—Burndy Corp
BARTHAP—Burndy Corp
BARTHOW MIN CORP
BARTHE WRIGHT CORP
BASEC UNIT—Electro Div H K Porter Co
Bashin (W M) Co Bashin Bidg Grove City Pa
BASIC UNIT—Electro Lighting Corp
BASIC UNIT—Electro Lighting Corp
BATTERY SCOPE—Christie Electric Corp
BAUER—MISSION Appliance Corp
BAUER—MISSION Appliance Corp
BAUER—MISSION Appliance Corp
BAUER—MISSION Appliance Corp
BAY-Tronic Co 43 Evergreen St Bayonne NJ
BEACON RAY—Federal Sign & Signal Corp
BEADS-IN-SLEEVES—Saxonburg Ceramics Inc
BEAM JECTOR—Electro Lighting Corp
BEAM STORM CORP
BEAM JECTOR—Electro Lighting Corp
BEAM STORM STOR Becker Bros Carbon Co 3450 S Laramie Ave Cicero 50 Bros Electrical Corp-see Ther Electric & Becker Gros Electrical Corp—see Ther Electric & Machine Works
Beckley Flectric Co Inc 468-470 Grand Ave Brooklyn 38 NY
BECCO—Westinghouse Electric Corp
Beede Electrical Instrument Co Inc
BELLOAP—Sprague Electric Corp
BELLOA—Bogue Electric Mfg Co
BELLON—Bogue Electric Mfg Co
BELBOND—Belden Mfg Co
BELBOND—Belden Mfg Co
BELBOND—Belden Mfg Co
BELBONAMEL—Belden Mfg Co
BELDONAMEL—Belden Mfg Co
BELDONAMEL—Belden Mfg Co BELDFOIL—Belden Mfg Co
BELDONLITE—Stamford Metal Specialty Co Inc
BELDSOIL—Belden Mfg Co
BELDTHERM—Belden Mfg Co Bell Electric Co 5735 S Claremont Ave Chicago 36 BELL LAMP—Mole-Richardson Co Bell Lumber & Pole Co 524 Midland Bank Bldg Minneapolis 1 Minn Bell Pole Co Ltd—see Bell Lumber & Pole Co Bell Sound Systems Inc 555 Marion Rd Columbus 7 Bellevue Industrial Furnace Co 2620 Crane Ave Detroit 14 Mich BELLOFRAM—General Control Co BELT-AIR-Buffalo Forge Co

BELTA—Diamond Expansion Bolt Co Ina Benbow Mfg Co—see Insul-B-Corp BENFIELD—Steelduct Co Benjamin Div Thomas Industries Inc 207 E Broad-ENFIELD—Steelduct Co-enjamin Div Thomas Industries Inc. 207 E Broad-way Louisville 2 Ky enjamin Reel Products Inc. 10700 Broadway Cleve-land 25 Ohio enson (Alexander R) Co Inc. 2 Davis Rd New Hartford NY Benson (Alexander R) Co Inc 2 Davis Rd New Hartford NY BERALOV—Driver (Wilbur B) Co Bergen Laboratories Inc 60 Spruce St Paterson 1 Berko Electric Mfg Corp 182-20 Liberty Ave Jamaica 12 NY Berkshire Laboratories 942 Bank Village Greenville NH
Berkshire Transformer Corp Kent Conn
RERMICO—Brown Co
Bernard-Franklin Co Inc Frankford & Torresdale Aves
Philadelphia 24 Pa
Bernina Sewing Machine Co 29 W 35 St NY 1 NY
Berns Air King Corp 3050 N Rockwell St Chicago
III
Sergy (Otto) Co Inc 740 Device Park Ave Rocks Bernz (Otto) Co Inc 740 Driving Park Ave Rochester 13 NY
BERNZ-O-MATIC—Bernz (Otto) Co Inc
BERNZRITE—Bernz (Otto) Co Inc
Berny (William B) Co 117 Causeway St Boston 14
Mass Bertram (Harvey P) Co 2225 Bogen St Cincinnati BESTO-WIRE—Rhode Island Insulated Wire Co Inc BETA—Wakefield Lighting Div Beverly Shear Mfg Co 3023 W 111 St. Chicago 43 III BI-CAST—Bishop Mfg Corp
BI-FLO—Aerovent Fan Co Inc
BI-PRENE—Bishop Mfg Corp
BI-SEAL—Bishop Mfg Corp
Biddle (James G) Co 1316 Arch St Phila 7 Pa
Biddle Trade Publishing Co 2720 Beverly Blvd Los
Angeles 57 Calif
BIFURCATOR—DeBothezat Fans Div American Machine
& Metals Co Angeles 57 Calif
BIFURCATOR—DeBothezat Fans Div American Machine
& Metals Co
BIG GEAM—U-C-Lite Mfg Co
BIG GEAM—U-C-Lite Mfg Co
BIG GEAM—U-C-Lite Mfg Co
BIG GEAM—U-C-Lite Mfg Co
BILGER—Self-Lifting Plano Truck Co
BILGER—Self-Lifting Plano Truck Co
BILGER—Self-Lifting Plano Truck Co
BIILGER—Self-Lifting Plano Truck Co
BIILGER—Self-Lifting Plano Truck Co
BIILGER—Self-Lifting Plano Truck Co
BIILGER—Self-Lifting Co
BIN-VID—GENERAL CONSTRUCTION
BIN-FLO—BIN-Dicator Co
BIN-VID—Convair Inc
Bios Laboratories Inc 17 W 60 St New York 23 NY
BIRTSEIN PRODUCTS
Birdsell Mfg Co Inc—see Birdsell Products
Birdsell Mfg Co Inc—see Birdsell Products
Birdsell Mfg Co Inc—see Birdsell Products
Birdsell Products 350 N Halstead Pasadena Calif
Bishop Mfg Co 300-00 N Third St Phila 6 Pa
Black KL MFG Co
Black MD Specialty Co—see Blaco Mfg Co
Black MD Specialty Co—see Blaco Mfg Co
Black MD Specialty Co—see Blaco Mfg Co 14 Mo
Blackburn Specialty Co—see Blaco Mfg Co
Blackhawk Industrial Div Blackhawk Mfg Co 13320 W
Reichert PI Butler Wis
Blackhawk Industries 250 S Main St Dubuque
Blach Mfg Co 6541 Euclid Ave Cleveland 3 Ohio
BLAK-RAY-Ultra-Violet Products Inc
BLAKE—Couch (S H) Co Inc
BLAKE—Couch (S H) Co Inc
BLAKE—Couch (S H) Co Inc
BLISE Electronic Corp Sussex NJ
Blitz Electric Co 5713 Wentworth Ave Chicago 21 BLO-FAN—Emerson-Pryne Co Blonder-Tongue Laboratories Inc 9 Alling St Newark 2 NJ 2 NJ
Blowmyr (L R) Co—see Ripley Co Inc
Bl.U-RED—Associated American Winding Machines Inc
Bl.UE BONNET—Forston Co
BluE DIAMOND—Pioneer Gen-E-Motor Co
BluE DIAMOND—Whitman & Barnes Div United Drill & Tool Corp Blue M Electric Co 138th & Chatham Sts Blue Island III
BLUE-POINT—Snap-on-Tools Corp
BLUE TOP—Westinghouse Electric Corp Lamp Div
Bodendieck Tool Co P 0 Box 499 Taylorville III
Bodine Electric Co 2500 W Bradley PI Chicago 18 Bonne Electric to 2500 brauley Pr Chicago 10 111 Bogen (David) Co Inc—see Bogen-Presto Co Bogen-Presto Co Route 4 & Forest Ave (P 0 Box 500) Paramus NJ Bonne Electric Mfg Co 52 Iowa Ave Paterson 3 NJ BON-E-CON—Bonney Forge & Tool Works BONDEZE—Phelps Dodge Copper Products Corp Bonnell (Wm A) Co—see Bonnell Electric Mfg Co Inc Bonnell Electric Mfg Co Inc 192-194 Chambers St NY 7 NY 7 NY 10 Bonnell Electric Mfg Co Inc Bonnell Electric Mfg Co Inc Bonney Forge & Tool Works 2400 Rockhill Rd (North) Alliance Ohio Borden Co—see Beaver Pipe Tools Inc Borden Engineering Div Borden Engineering Div Borden Engineering Co—see Borden Engineering Div M J Johnson Aircraft Engineering Co Borden Engineering Div M J Johnson Aircraft Engi-neering Co Box 10 Morristown NJ neering Co Box 10 Morristown NJ
BORNISIL—Westinghouse Electric Corp
Borthig (George C) Co Inc P O Box 115 East Rutherford NJ
BOSS—Huenefeld Co
Boston Gear Works 14 Hayward St Quincy 71 Mass
Boston Wowen Hose & Rubber Co—see American Biltrite
Rubber Co Boston Woven Hose & Rubber Div Bound Brook Bearing Corp of America Bound Brook

Bound Brook Oil-Less Bearing Co—see Bound Brook Bearing Corp of America Bowers Battery & Spark Plug Co—see General Battery and Ceramic Corp Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif BOX-LOK—Metalectrics Inc Brach Mfg Corp 200 Central Ave Newark 3 NJ Bradley Laboratories Inc—see Bradley Semiconductor Corp Corp Bradley Semiconductor Corp 275 Welton St New Haven 11 Conn Brady (W H) Co 727 W Glendale Ave Milwaukee 9 Wis Milwaukee Co—Brady (WH) Co
Brady Milwaukee Co—Brady (WH) Co
Brand (William)-Rex Div American Enka Corp 31
Sudbury Rd Concord Mass
Brand Dielectrics 902 Main St Willimantic Conn
Branham Mareck & Duepner Inc—see B M D & R Inc
BRASCOLITE—Guth (Edwin F) Co
BRAZALDY—All-State Welding Alloys Co Inc
BREAKER-FUSE—General Electric Co Apparatus Sales
BREZEZ-BUILDERS—Bar-Brook Mfg Co Inc
BREAKER-Buffalo Forge Co
BREEZC BUILDERS—Bar-Brook Mfg Co Inc
BREEZC BUILDERS—Bar-Brook Mfg Co Inc
BREEZC BUILDERS—Bar-Brook Mfg Co Inc
BREEZC—Buffalo Forge Co
Breuer Electric Mfg Co 5100 N Ravenswood Ave Chicago 40 III
Brewer-Titchener Corp 111 Port Watson St Cortland
NY Brew. Bridgeport Fittings Inc. 209 Center St. Bridgeport 2
Cann
Bridgeport Hardware Mfg Corp. Scofield Ave. Bridgeport. 5
Conn
Bridgeport Switch Co—see Bridgeport. Fittings Inc.
Bridgeport Switch Co—see Bridgeport Fittings Inc.
Bridgeport Switch Co—see Bright Star Industries
Bright Star Battery Co—see Bright Star Industries
Bright Star Industries. 600 Getty Ave. Clifton. NJ
Bristol Motor Div. Vocatine. Co. of America Inc.
Coulter St. 016 Saybrook. Conn
BRITE BEAM—Lightalarms Inc.
BROADSTREETER—Metalcraft Products Co. Inc.
BROADSTREETER—Metalcraft Products Co. Inc.
BROWNO—Western Insulated Wire.
BROWNO—Vestern Insulated Wire.
BROWNO—Vestern Insulated Wire.
BROWNO—Verity Of Saybery Sayb Bridgeport Fittings Inc 209 Center St Bridgeport 2 Cunn Chesterton Ind
Brundee Co 48 Hale St Cranford NJ
Brunswick Instruments P 0 Box 813 New Brunswick NI NJ
BRUNT—Parr Mfg Corp
Brunt Faultfinder Mfg Co—see Brundee Co
Bryant Electric Co 14/21 State St (Box D Barnum
Sta) Bridgeport 2 Conn
Bryant Mfg Co 410 N Paulina St Chicago 22 III
BUBBLTROL—Automatic Control Co
Buchanan Electrical Products Corp 434 US Route 22
Hillside August Control Co Hillside NJ Wood Industries Inc BUCKEYE—Gar Wood Industries Inc BUCKEYE—Youngstown Sheet & Tube Co Buckles (Chris) Inc 4830 S Hoyne Ave Chicago 9 III
BUDGET-LITES—Litecraft Mfg Co
BUDGETLITE—Ainsworth Lighting Inc
BUDGIT—Shaw-Box Crane & Hoist Div
Buffalo Forge Co 490 Broadway Buffalo 5 NY
Buffalo Machine Mfg Co 586 Tonawanda St Buffalo 7 NY
SUG-A-WAY—Westinghouse Electric Corp Lamp Div
BUG CHASER—Amplex Corp
Buggie (HH)—see Burndy Corp
BUILDERS—Stanley Power Tools Div
Building Service Co 4923 18th Ave S Minneapolis 17
Minn
BUILT-IN-WATCHMEN—Westinghouse Electric Corp
BUILL DOG—American Biltrite Rubber Co Boston
Woven Hose & Rubber Div
BULL DOG—Marvel Lamp Co
Bulldog Div Gregory Industries Inc Toledo Ave & East
28 St Lorain Ohio
Buildog Electric of Denver—see Young Electric & Mfg
Co Inc Buildog Electric of Denver—see Young Electric of Ming Co Inc BuilDog Electric Products Co—see I-T-E Circuit Breaker Co BuilDog Electric Products Div BULLS-I-UNIT—Kirkland (H R) Co Bunnell (G F) Co-see Atlantic Engravers Inc Bunnell (G F) Co—see Atlantic Engravers Inc
Bunting Brass and Bronze Co 715 Spencer St Toledo
1 Ohio
Burbank Electrical Products
Box 7 Burbank Calif
BURCAP—Burndy Corp Burgess Battery Co Handi Craft Div—see Burgess Vibrocrafters Inc Burgess Battery Co Freeport III Burgess Vibrocrafters Inc Grayslake III Burgess Vibrocrafters Inc Grayslake III Burling Instrument Co Inc 16 River Rd Chatham NJ Burndy Corp Norwalk Conn Burndy Engineering Co—see Burndy Corp Burnley Battery & Mfg Corp 103 Clay St (P 0 Box 511) North East Pa Burns (James F) Co 1601 Industrial Highway Pennsauken NJ Burr Aluminum Products Div—see Keyes-Davis Co
Burt Mfg Co 936 S High St Akron 11 Ohio
Burton Mfg Co 2520 Colorado Ave Santa Monica
Calif
Busada Mfg Corp. 32-21 Downing St Flushing 54 NY
Bush Transformer Corp. 707 North St Endicott NY
BUSS—Bussmann Mfg Div McGraw-Edison Co
Bussmann Mfg Div McGraw-Edison Co
Jefferson St Louis 7 Mo
JUSTER—Lidseen of North Carolina Inc
BUSTER—Lidseen of North Carolina Inc
BUSTRIBUTION—1-T-E Circuit Breaker Co
BUITIN—Burndy Corp
BUZABEL—Edwards Co Inc
BUZACALL—Edwards Co Inc
BUZACALL—Bush County Corp.

C & B Engineering and Fabricating Corp P 0 Box 8701
Houston Tex
CBC Electronics Co Inc 2601 N Howard St Philadelphia 33 Pa
CCA—Coil Co of America Inc
C & D Batteries Div Electric Autolite Co
ton & Cherry Sts Conshohocken Pa
CDM—Curits Development & M\*g Co
C&E—Ericson M\*g Co
C&E—Ericson M\*g Co
CFI—Day-Brite Lighting Inc
C-H—Cutler-Hammer Inc
C-J-R—Metropolitan Electric M\*fg Corp
C-LECTOR—Century Lighting Inc
C-L-LCTOR—Century Lighting Inc
C-L-X—Simplex Wire & Cable Co
C M—Chicago Miniature Lamp Works
CM—Chisholm-Moore Hoist Div Columbus McKinnon
Corp C-L-X—Simplex Wire & Cable Co
CM—Chicago Miniature Lamp Works
CM—Chisholm-Moore Hoist Div Columbus McKinnon
Corp
C N M—Condult Nipple Mfg Co
COM—Wing (L. J) Mfg Co
C-Q-T—Chase-Shawmut Co
C T R—Cincinnati Time Recorder Co
C & W Sales Co—see Clark (George P) Div Cragin &
Wilkins Co Inc
CWC Corp—see Crozier Machine Tool Co
CABILETROU—General Electric Co
CABILETROU—General Flooting Co
CABILETROU—General Coloridation
CADET——Internation
CADET——Internation
CADET——Internation
CADET——Internation
CADET——Internation
CADET——Internation
CADET——Internation
CALCULITE—Lightolier Inc
CALCULITE—Lightolie Caltron Products Co 35.18 W Pico Bivd Los Angeles 19 Calif Calumet Plastics Inc 11201 S Cottage Grove Ave Chicago 28 III Calvert Co 19851 Ingersoil Dr Rocky River 16 Ohio Cam-Lok Div Empire Products Inc 9213 Blue Ash Rd Cincinnati 42 Ohio CAM-VAR-Electro-Technical Products Div Camblock Corp 825 Bronx River Ave New York 72 NY

CAMBRICOID—American Electric Cable Co CAMEO-ARGORDETE Opto Inc Can Arm Corp P 0 Box 156 Champlain NY

CANDELITE—Duro-Test Corp

CANDLEFLAME—North American Electric Lamp Co CANDYLBEME—North American Electric Lamp Co CANDYLBEME—North American Electric Lamp Co CANDYLBEME—North American Electric Camp Co CANDYLBEME—North American Electric Camp Co CANDYLBEME—North American Electric Camp Co CANDYLBEME—Opto-All Newboldt St Los Angeles 31 Calif Cannon Electric Development Co—see Cannon Electric Co Cannon Electric Development Co—see Co CANSEAL—Cannon Electric Co CAPAC—Engelhard Industries Inc CAPACOHMETER—Simpson Electric Co CAPCO—Capitol Stage Lighting Co Inc CAPCOLITE—Capital Stage Lighting Co Inc CAPCOLITE—Capital Stage Lighting Co Inc Capewell Mfg Co 60-70 Governor St I Conn Hartford 2 Conn
CAPILLARY—Air & Refrigeration Corp
Capitol Hardware Mfg Co Inc 400 N Leavitt St
Chicago III
Capitol Stage Lighting Co Inc 527 W 45 St New
York 36 NY
CAPRI—Frigid Inc CAPRI—Swivelier Co Inc Capson Mfg Co 2565 W Fullerton Ave Chicago 47 CAPTI-VOLT—Vickers Inc CARBI-TWIST—U S Expansion Bolt Co

Carboline Co 32 Hanley Industrial Ct St Louis 17 Mo
Carboline ub Se Planny Industrial Ct. St. Louis 17
Mo
Carbolineum Wood Preserving Co 6683 N 40 St.
Milwaukee 9 Wis
CARBOLUNB—Carbone Corp
CARBOLUNB—Carbone Corp
CARBOLUNB—Carbone Corp
CARBOLUNE—Carbone Corp
CARBOLUTE—Continental-Wirt Electronics Corp
Carbon Engineering Corp P 0 Box 256 Slinger Wis
Carbone Corp 400 Myrtle Ave Boonton NJ
CARENCO—Carbon Engineering Corp
CARGOLITE—Steber Div Pyle-National Co
Carlon Products Corp P 0 Box 333 Aurora Ohio
Carney (B J) & Co 326 Peyton Bldg Spokane B
Wash Carney (B J) & Co 326 Peyton Bldg Spokane B Wath
Carol Cable Co 190 Middle St Pawtucket RI
CAROPRENE—Carol Cable Co
Carpenter Mfg Co 2250 Gilman Square Somerville
45 Mass
Carrier Corp Carrier Parkway Syracuse 1 NY
Carter Motor Co 2711 W George St Chicago 18 III
CARTON—Self-Lifting Piano Truck Co
CAFRRIJ-DRV—Pyramid Electric Co
Case (J I) Co Racine Wis
Castle Engineering Co P 0 Box 35 Seneca Castle
NY
Hills Corp—see Hartzell Propeller Fan Co NY Castle Hills Corp—see Hartzell Propeller Fan Co CASTOMATIC—Federated Metals Div American Smelt-ing & Refning Co CATALINA—Benjamin Division (Thomas Industries Inc)
CATALINA—Industrial Lamp Corp
CATALINA—Swivelier Co Inc
CATARACT—Ajax Electric Co
CATARACT—Tractor Co Industrial Engine Plant Peoria Cathodic Protection Service 4601 Stanford St Houston Tex Cathonics Inc—see Cold Cathode Lighting Corp CAVALIER—Wakefield Lighting Div Cavaller Air Conditioning Co—see Forston Co Cavaller Corp Electric Heating Div 343 W First St. Chattanooga Tenn Ceco Steel Products Corp 5601 W 26 St Chicago 50 III CEETEE—Crescent Tool Co CEFCO—Commercial Enclosed Fuse Co of NJ CEILCELL—United Lighting & Ceiling Co CEILGLO—United Lighting & Ceiling Co CEILGLO—United Lighting & Ceiling Co CEILGLO—United Lighting & Ceiling Co CEILGRID—United Co CEILGRID—United Lighting & Ceiling Co CEILGRID—United Co CEILGRID—United Lighting & Ceiling Co CEILGRID—United Co CEILGRID—United Co CEILGRID—United Lighting & Ceiling Co CEILGRID—United Co CEILGRID—United Co CEILGRID—United Co CEILGRID—United Lighting & Ceiling Co CEILGRID—United Co CEILGRID—Unite Cathodic Protection Service 4601 Stanford St Hous-Tenn
CEILLTE—United Lighting & Ceiling Co
CEILO—Gibson Mfg Co
CEILOME—United Lighting & Ceiling Co
CELENAME—Belden Mfg Co
CELENAME—Online Mfg Co
CELENAME—Online Mfg Co
CELOROM—Continental-Diamond Fibre
CEMCO—Connecticut Electric Mfg Co
CENCO—Central Scientific Co
CENTAWATT—Wesix Electric Heater
Central Noncorrelative Co
Central Noncorrelative Co
Central Porcelain Co 507 Railroad St Columbiana
Ohio Ohio
Central Scientific Co 1700 Irving Pk Rd Chicago
13 III
Central Station Signals Inc 53 W 23 St New York
10 NY
Central Transformer Co 900 W Jackson Blvd Chicago
7 III Central Transformer Corp P 0 Box 687 Pine Bluff Central transformer body
Ark
Centralite Co Inc Dayton & Central Awes Cincinnati 14 Ohio
CENTRI-CORE—Alpha Metals Inc
CENTRILINE—Westinghouse Electric Corp Sturtevant Div Div Letter Standard Letter Corp Standard Div CENTRL-VENT—Lau Blower Co CENTROL—Nelson Electric Mfg Co CENTRON—Sunbeam Lighting Co Century Electric Co 18th & Pine Sts St Louis 3 Mo Mo Century Fan & Ventilator Co 45 Cedar St Stam-ford Conn Century Lighting Inc 521 W 43 St New York 36 NY

CERAMAGNET—Stackpole Carbon Co
Ceramic Specialties Co—see Lint (Clyde W)
CERTAIN CURTAIN—Hayes (C I) Inc
Certified Ballasts Mfrs—see Fleur-O-Lier Mfrs
Certified Bellard Mfrs—see Fleur-O-Lier Mfrs
Chadsey Corp P 0 Box 1858 Hartford 1 Conn
Chadsey Mfg Co Inc—see Chadsey Corp
Chain Belt Co 4701 W Greenfield Ave Milwaukee 1
Wis Chaidsey mig Us The See Chausey Wis Chain Belt Co 4701 W Greenfield Ave Milwaukee 1 Wis Chain Belt Co 4701 W Greenfield Ave Milwaukee 1 CHAIN MATE—Radix Wire Co CHAIN-0-LITE—House-0-Lite Corp Chalfant Products Co Inc 11525 Madison Ave Cleveland 2 Ohio Chause Chause Communication Co

CHANGE-OUT—Joy Mfg Co
CHANNEL-DUCT—Giastic Corp
CHANNELITE—Swivelier Co Inc
CHANNELITE—Swivelier Co Inc
CHANNELITE—Swivelier Co Inc
CHANNELITE—Swivelier Co Inc
CHANGE CO
CHANGE
CH Charles Machine Works Inc P O Box 66 Perry Okia
harleston Rubber Co Stark Industrial Park Charlestion SC
CHASESTOS—Chase & Sons Inc
CHASE—Thomas & Betts Co
CHASE—Thomas & Betts Co
CHASE Brass & Copper Co Inc 236 Grand St Waterbury 20 Conn
CHASE—Inc—Chase & Sons Inc
CHASE—MOLD—Chase & Sons Inc
CHASE—MOLD—Chase & Sons Inc
CHASE—MINE—Chase & Sons Inc
CHASE—MINE—Chase & Sons Inc
CHASE—Shawmut Co 374 Merrimac St Newburyport
Mais
Chase & Sons Inc 26 Spruce St North Quincy Mass
CHASE WARP—Chase & Sons Inc
CHEERLIGHT—Aerolux Lights Corp
CHEEM—MARINE—Hubbell (Harwy) Inc
Chemalloy Electronics Corp Gillespie Field Santee
Calif
Cherry Electrical Products Corp 1650 Deerfield Rd Calif Carrial Products Corp GIIESADE FIEld Santee Calif Cherry Electrical Products Corp 1650 Deerfield Rd Highland Park III Chesflex Corp 684 Nepperhan Ave Vonkers NY Chester Cable Corp Oakland Ave Chester NY Chester Hoist Div National Screw & Mfg Co Lishon Ohio Chester Mfg Co—see Chester Hoist Div National Screw & Mfg Co CHICAGO—Klein (Mathias) & Sons CHICAGO—Lidseen of North Carolina Inc Chicago Blower Corp 9867 Pacific Ave Franklin Park III Chicago Commutator Inc Wheeling Rd & Exchange Ct Wheeling III Chicago Decalcomania Co 3310 Elston Ave Chicago 18 III Chicago Decalcomania Co 3310 Elston Ave Chicago 18 III Chicago Casting Mfg Co 2510-14 W Monroe St Chicago Die Casting Mfg Co 2510-14 W Monroe St Chicago 22 III Chicago Mental Hose Corp—see Flexonics Corp Chicago Miniature Lamp Works 1500 N Ogden Ave Chicago Oli II Chicago Mental Hose Corp—see Flexonics Corp Chicago Miniature Lamp Works 1500 N Ogden Ave Chicago 10 III Chicago Mental Hose Co—see Ware Fuse Corp CHICAGO-SIGNAL—Couch (Sh) Co Inc Chicago Chilor State Co—see Ware Fuse Corp CHICAGO-Chicago Miniature Camp Works 2411 W Belmont Ave Chicago III III CHIEF—Collins Machinery Corp CHICAGO-Chicago Miniature Lamp Works CHILL AIR—National Engineering & Mfg Co CHINALAK—Dolph (John C) Co Chisholm-Moore Hoist Corp—see Chishold-Moore Hoist Div Columbus McKinnon Corp Chicago Chicag Chicago Commutator Inc Wheeling Rd & Exchange Ct Wheeling III Chicago Decalcomania Co 3310 Elston Ave Chicago 18 III CIRCLE B—Bristol motor DIV VOCAINE
Ca Inc
Ca Inc
CIRCLE D—Natale Machine & Tool Co
Circle F Mfg Co 720 Monmouth 5t Trenton 4 NJ
CIRCLE L—Lew Electric Fittings Co
Circle Wire and Cable Corp 5500 Maspeth Ave
Maspeth LI NY
Circlelite Corp—see House-0-Lite Corp
CIRCLELIVE—Pfaff & Kendall
CIRCLEMOLD—Circle Wire & Cable Corp
CIRCLESTATH—Circle Wire & Cable Corp
CIRCLESTOL—Electrical Mfg Co
CIRCLESTOL—Wisson (JA) Lighting & Display Inc
CIRCLINE—Sun-Lite Mfg Co CIRCLOC—Circle Wire & Cable Corp CIRCLOK—Circle F Mfg Co CIRCUIT-SWITCHER-S & C Electric Co CIRCUITROL—Continental Electric Equipment Co CIRCULAIR—Kisco Co Inc Circulators Devices Mfg Corp—see Frigid Inc CIRCULITE—Lightolier Inc

CHANGE-A-VOLT-Carter Motor Co

CIRFLEX—Circle Wire & Cable Corp
CIRKLAIR—Folsom Co. Inc
CIRTEX—Circle Wire & Cable Corp
CIRTUBE—Circle Wire & Cable Corp
CIRTUP—Circle Wire & Cable Corp
CIRTUP—Circle Wire & Cable Corp
CIRTUP—Circle Wire & Cable Corp
CI CLAREMONT—Lightolier Inc Clark (George P) Div Cragin & Wilkins Co Inc Fitch-burg Mass Clark Controller Co 1146 E 152 St Cleveland 10 Ohio
CLASSIC—Carter Motor Co
CLAUDE BANKS—Kirlin Co
CLEAN-FLO—Allis (Louis) Co
CLEAN-G—MATIC—Siebring Mfg Co
CLEAN-G—MATIC—Siebring Mfg Co
CLEAN Sweep Co 65344/2 Whittier Blvd Los Angeles
22 Calif CLEAR-SELE-Rust-Oleum Corp. CLEARSITE—Economy Fuse Div Clement Electric Co 223 Erie St N W Grand Rapids 2 Mich Clement Industrial Electric Co—see Clement Electric Clements Mfg Co 6650 S Narragansett Ave Chicago 38 III Cleveland Electric Motor Co 5213 Chester Ave Cleve-Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Onio
Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio
Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio
Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio
Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio
Clil Motor Chestrical Fittings Corp
Clil Trencher Co 20100 St Clair Ave Cleveland 17 Ohio
Clil Motor Chestrical Fittings Corp
Clil Trencher Climator Co 20100 St Mass Climator Co 3000 Eastbourne Ave Baltimore 24 Md
Clifton Mfg Co Inc 34 Topalian St Mattapan Boston 25 Mass
CLIMATE CHANGER—Trane Co
CLIMATE CHANGER—Trane Co
CLIMATE CHANGER—Trane Co
CLIMITER—Hueller Climatrol
CLIMIAX—Glade Mfg Co
CLINI-GRAPH—Welseler Instruments Corp
CLIPPER—General Controls Co
CLIPPER—Halter Brothers
Clipper Mfg Co 2800 Warwick Kansas City 8 Mo
CLORINOL—Sprague Electric Co
CLOSED-BACK—U S Expansion Bolt Co
COCO—Coil Co of America Inc
Code Corp
Cofe Equipment Sales Co—see Code Corp
Cofe Products Corp—see Code Corp
Cofe America Inc
COIl Cool Cathode Lighting Corp
Coli Co of America Inc
Coli Co of America Inc
Coli Cool Cathode Lighting Corp
Coli Cool Cathode Lighting Corp
Coli Cool Cathode Lighting Corp
Coli Coli Cool America Inc
Coli Cool Cathode Lighting Corp
Coli Coli Cool Cat land 3 Ohio Cleveland Switchboard Co 2925 E 79 St Cleveland Calif
Cole Electric Products Co—see Federal Pacific
Collins Machinery Corp 955 Monterey Pass Rd Monterey Park Calif
Collyer Insulated Wire Co 249 Roosevelt Ave Pawtucket RI Cole Electric Products Co—see Federal Pacific
Collins Machinery Corp 955 Monterey Pass Rd Monterey Park Calif
Collyer Insulated Wire Co 249 Roosevelt Ave Pawtucket RI
Colonial Electric Products Div Colonial Neon Co Inc
1-115 Market St East Paterson NJ
COLOR-KEVED—Thomas & Betts Co
COLORBEAM—Amplex Corp
COLORSOPE—Simpson Electric Co
COLORTONE—Jay Lighting Mfg Co Inc
COLORTONE—Jay Lighting Mfg Co Inc
COLORTONE—Vestinghouse Electric Corp
COLORTONE—Vestinghouse Electric Corp
COLORTONE—Westinghouse Electric Corp
COLOWING Cable & Electric Corp 255 Chestnut St
Brooklya 8 NY
Columbia Cable & Electric Corp 255 Chestnut St
Brooklya 8 NY
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio
Columbia Electric & Mfg Co North 2310 Fancher
Way Spo e Wash
COLUMBIA-LEX—Columbia Coble & Electric Corp
Columbia Industries Inc—see Columbia Products Inc
Columbia Metal Box Co 260 E 143 St NY 51 NY
Columbia Metal Box Co 260 E 143 St NY 51 NY
Columbia Metal Box Co 260 E 143 St NY 51 NY
Columbia Products Inc
Columbia Wire & Supply Co 2850 Irving Park Rd
Chicago 18 III
COLUMBIA—Condult Pipe Products Co
Columbia Wire & Supply Co 2850 Irving Park Rd
Chicago 18 III
COLUMBIA—Condult Pipe Products Co
Columbia Products Corp—Greibach Instruments Corp
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich
Comar Electric Co 3349 W Addison Chicago 18 III
COMBI—Wodack Electric Tool Corp
COMET—Standard Electric Co Inc
COMET—Standard Electric Co Inc
COMFORT STANDARD Controls Co of America
COMFORT-SHELD—Lincoln Electric Co
COMMONTO CONTROL—Controls Co of America
COMMONTO CONTROL—Controls Co of America
COMMONTO CONTROL—Controls Co of Montrol
COMMONTO CONTROL—Control Co Of Montrol
COMMONTO CONTROL—Con COMMANDER—Sensitive Research Instrument Corp Commercial Enclosed Fuse Co of NJ 6812 Polk St Guttenberg NJ Guttenberg NJ Commercial Reflector & Mfg Co 3109 Maple Ave Los Angeles 11 Calif

COMMERCIALAIRE—Frigid Inc COMMODORE—Wakefield Lighting Div Commercialaire Corp of America 840 E 98 St Brook-lyn 36 NY Corborundum Co (Refractories Div)—see Globar CORDETTE CASUALS—Moe Light Div Thomas Indus-Commercialaire Corp of America 840 E 98 St Brooklyn 36 NY
COMMERCIALITE—Commercial Reflector & Mfg Co
COMMUNICAL—Faraday Inc
COMMUNICATOR—Godfrey Mfg Co
COMPACK—General Cable Corp
COMPACK—Linemaster Switch Corp
COMPACT—Linemaster Switch Corp
COMPACT—Linemaster Switch Corp
COMPACT—Linemaster Switch Corp
COMPACT—Bound Brook Bearing Corp of America
COMPO—Bound Brook Bearing Corp of America
COMPO—Bound Brook Bearing Corp of America
COMPRESTO—Olin Conductors
COMPRESTO—Olin Conductors
COMPRESTO—Olin Conductors
COMPRESTO—Olin Conductors
CON-FER-PHONE—Simpson (Mark) Mfg Co Inc
Conant Laboratories Box 3997 Bethany Station
Lincoln 5 Neb
CONCENTROL—Continental Electric Equipment Co
Concrete Engineering Co—see Ceco Steel Products
Corp Concrete Engineering Co—see Ceco Steel Products Corp
COPDEX—Simplex Wire & Cable Co
CondiLite Corp 889 Broadway New York 3 NY
CONDIT—Allis-Chalmers Mfg Co
CONDU-MATIC—Chamor Mfg Corp
CONDU-MATIC—Chamor Mfg Corp
CONDUCTO-LUBE—Cool-Amp Co
Conduffor Corp 13560 Lorain Ave (P 0 8ox 2748)
Cleveland 11 Ohio
CONDUIT OF COLUMBUS—Conduit Pipe Products Co
Conduit Fittings Corp 6400 W 66th St Chicago 38
III Onduit Nipple Mfg Co 1455 Spring Garden Ave Pittsburgh 12 Pa Conduit Pipe Products Co IST W Fulton St Columbus 16 Ohio CONDULET—Crouse-Hinds Co CONEX—Welss & Bineller Merchandise Corp CONFERENCE-TALK—Simpson (Mark) Mfg Co Inc CONIC—Hint Inc Connecticut Electric Mfg Co Main St Bantam Connecticut Electric Mfg Co Mfg Connecticut Hard Rubber Co 407 East St New Haven 9 Conn
CONQUEROR—York Div Borg-Warner Corp
CONNOD THE CONTROL—Dixie Controller Inc
CONS-0-LARM—Kidde Ultrasonic & Detection Alarms
Div Walter Kidde & Co Inc
CONSOLAIRE—Remington Corp
Consolidated Pipe Co of America 1066 Home Ave
Akron Ohio
CONSTANT-FLOW—Blue M Electric Co
CONSTELLATION—Trindl Products Ltd
CONTINENTAL—Globe Lighting Products Inc
CONTINENTAL—Globe Lighting Products Inc
Continental Carbon Inc—see Continental-Wirt Electronics Corp necticut Continental Caron Inc—see Continental-Wirt Elec-tronics Corp Continental-Diamond Fibre Newark Del Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif Continental Electric Co Inc 325 Ferry St Newark 5 Continental Electric Equipment Co Box 1055 Cincinnati I Ohio Continental Radiant Glass Heating Corp 4 W 40 St New York 18 NY Continental Wire Corp P 0 Box 366 Wallingford Conn Continental-Wirt Electronics Corp 26 W Queen Lane CONTOURAMA—Dixie Controller Inc CONTA-DYNE—Square D Co Electric Controller & Mfg Div
Control Panel Corp 4431 W Division St Chicago 51 Control Switch Div Controls Co of America 4218-30 W
Lake St Chicago 24 III
CONTROLARC—Vickers Inc
CONTROLAD—Marathon Special Products Corp
CONTROLENS—Holophane Co Inc
CONTROLETE—Line Material Industries
CONTROLITE—Line Material Industries
CONTROLITE—Ward Leonard Electric Co
CONTROLORA—Sangamo Electric Co
Controls Co of America 2450 N 32 St Milwaukee 45
Wis Controls to or America 2490 N 32 St Milwaukee 49 Wis Controls Co of America Control Switch Div 1420 Delmar Dr Folcroft Pa Convair Inc P 0 Box 9671 Pittsburgh 16 Pa CONVERS-O-CALL—Adcrafters Co CONVERTI-FUSE—General Electric Co Apparatus Sales Cook's Son (Adam) Inc 5 N Stiles St Linden NJ Cool-Amp Co 8603 W 17 Av Portland 19 Ore COU-CIRCLE-ATOR—Kisco Co Inc Cool-ette Inc 7535 W 8 Mile Rd Detroit 21 Mich COOL-SPOT—Signal Electric Div King-Seeley Corp Coolerator Div—see McGraw-Edison Co Albion Div COOLERO—Hirschman-Pohle Co Inc COOLINE—Ohio Brass Co Cooper (D C) Co 1467 S Michigan Ave Chicago 5 III per Hewitt Electric Co 720-732 Grand St Hoboken RJ
Co-operative Utilities Co Inc 4637-39 Mulberry St
Phila 24 Pa
COPACO—Cottrell Paper Co Inc
COPALAM—Cottrell Paper Co Inc
Cope (T J) Div Rome Cable Corp
Collegeville 5 Pa
COPING-LITE—Magni Flood Inc
COPPERREAD—Chicago Expansion Bolt Co
COPPERREAD—Chicago Expansion Bolt Co
COPPERREY—Mational-Standard Co
COPPERREY—Mational-Standard Co
COPPERROW—Globe Lighting Products Inc
Copperweld Steel Co Wire and Cable Div Glassport
Pa Coppu. Mas us Engineering Corp 344 Park Ave Worcester 10

Corborundum Co (Refractories Div)—see Globar CORDETTE CASUALS—Moe Light Div Thomas Indusdustries Inc Cordomatic Div Vacuum Cleaner Corp of America 1724 W Indiana Ave Phila 32 Pa CORDON—I-T-E Circuit Breaker Co CORE BORE—Equipment Corp of America CORE-O-MATIC—Induction Heating Corp CORE VENT—US Expansion Bolt Co CORE-VENT—US Expansion Bolt Co Cornell-Dubliler Electric Corp 333 Hamilton Blvd South Plainfield NJ Corning Glass Works Corning NY Cornish Wire Co Inc 50 Church St NY 7 NY Cornos Equipment Co Inc—see Corona Mfg Corp Corona Mfg Corp 11300 Tuxford St Sun Valley Calif CORONADO—Benjamin Div CORMET—Jay Lighting Mfg Co Inc COROPRENE—Cornish Wire Co Inc COROS—Westinghouse Electric Corp COROLINE—Day-Brite Lighting Inc CORRALUME—Day-Brite Lighting Inc CORRALUME—Say-Brite Lighting Inc CORRALUME—Day-Brite Lighting Inc CORRALUME—Say-Brite Lighting Inc CORRALUME—Say-Brite Lighting Inc CORRALUME—Say-Brite Lighting Inc CORRALUME—S Mass Counter & Control Corp 4503 W Brown Deer Rd COUNTER - Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis COUNTER - FLO—Electrend Products Corp COUNTER - FLO—Electrend Products Corp COUNTER - FLO—Electrend Corp COUNTER - FLOW—Blue M Electric Co COUNTER - FLOW—Blue M Electric Corp Cox and Co Inc 15 E 23 St. New York 10 NY COZY GLOW—Westinghouse Electric Corp CRADIECLID—Electrowert Inc CRAFT LITE—Paramount Industries Inc CRAFTSLOPE—Waterman Products Co Inc CRAFTSCOPE—Waterman Products Co Inc CRAFTSMEM—Tevco Insulated Wire CRAMIT—Kirel Inc Cramer (R W) Co—See Cramer Controls Corp Cramer Controls Corp Main St Centerbrook Conn Crane (H W) Co—15 N 9th Ave Maywood III Crane Veyor Corp 1240 S Boyle Ave Los Angeles 23 Calif Calif CRESCENT—Abrams Lighting CRESCENT—Barksdale Valves CRESCENT—Wheeler Reflector Co Crescent Co Inc 20 Central Ave Crescent Insulated Wire Cable Co 319 N Olden Ave Trenton 5 NJ Crescent Plastics Inc 955 Diamond Ave Evansville 7 Crescent Plastics Inc 955 Diamond Ave Evansville 7
Ind
Crescent Tool Co 200 Harrison St Jamestown NY
CRESCORD—Crescent Insulated Wire & Cable Co
CRESTLEX—Crescent Insulated Wire & Cable Co
CRESTLEX—Crescent Plastics Inc
Crest Transformer Corp 1834-36 W North Ave Chicago 22
Ill
CRESTBRITE—Crest Transformer Corp
CRESTOLOY—Crescent Tool Co
CRESTROL—Crest Transformer Corp
CRESTROL—CRESTROL—CRESTROL—CRESTROL—CRESTRO Crozier Machine Tool Co 684 N Prairie Av Hawthorne Calif
Crucible Steel Co of America Oliver Bldg Mellon Sq
Pittsburgh 22 Pa
RRYOLYTIC—Safe-T-Mike Corp
CRYSTAL—Royal Electric Corp
CRYSTAL—Royal Electric Corp
CRYSTALER—Duro-Test Corp
CRYSTALER—Duro-Test Corp
CRYSTALER—Duro-Test Corp
CUBLCELL—United Lighting & Celling Co
CRYOLYTIC—Safe-T-Mike Corp Cummins-Chicago Corp—see Cummins Portable Tools Div John Oster Mfg Co Cummins Portable Tool Div John Oster Mfg Co 5055 N Lydell Ave Milwaukee 17 Wis CUPSON—Driver (Wilbur B) Co Curran Engineering Co—see So-Cal Electro Products CURRENTROL—Lincoln Electric Co
CURTAIN OF LIGHT—Electronic Control Corp
CURTICELL—Curtis Lighting Div
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis waukee 1b WIS
Curtis Lighting Div Curtis-All Brite Lighting Inc
6135 W 65 St Chicago 3B III
Curtis Lighting Inc—see Curtis Lighting Div
Curtis Mfg Co Refrigeration Div 1905 Kienlen Ave
St Louis 20 Mo

CURTISTRIP—Curtis Lighting Div Curtis-All Brite Lighting Inc
CURYACORE—Allis-Chalmers Mfg Co
CURVETTE—Steber Div Pyle-National Co
CURVICE Surgical Products Co—see Mastercraft Plastics
Co Inc
CUSTOM LINE—White-Rodgers Co
CUSTOM-TEN—Simpson (Mark) Mfg Co Inc
CUTAWL—International Register Co
CUSTOM-TEN—Simpson (Mark) Mfg Co Inc
CUTAWL—International Register Co
CUTE CUTAWL—International Register Co
CUTE CUTAWL—International Register Co
CUTE CUTE COUNTY COUN

#### D

DFI—Designers for Industry Inc
D H D—Diamond Expansion Bolt Co Inc
DHS—Distribution & High Line Specialties Co
DDR Inc—see Hardman (H V) Co Inc
D & R Ltd 402 E Gutierrez St P O Box 1500 Santa
Barbara Calif
DTX—Diamond Wire & Cable Co
DAN-N-ITE—Premax Products Div
DUF—Diamond Wire & Cable Co
Dage Television Div Thompson Products Inc
City Ind
DAGLAS—Phelps Dodge Copper Products Corp
DAISY—American Pulley Co
Dake Corp 724 Robbins Rd Grand Haven Mich
Dake Engine Co—see Dake Corp
Dalmotor Co 1375 Clay St Santa Clara Calif
Dalmotron Co 534 Laurel St San Carlos Calif
Dalmotor Co 534 Laurel St San Carlos Calif
Dalmotor Co 534 Laurel St San Carlos Calif
Dalmotor Lectric Heating Co 11 Goodhue St Salem
Mass Dalton Electric Heating Co 11 Goodhue St Salem Mass
DAMCO—Murray (D A) Co Inc
DAMPCOAT—Wilbur & Williams Co
Dampp-Chaser Inc 1404 Spartanburg Hwy Hendersonville NC
Dana Fan & Blower Corp 2644 Colerain Ave Cinclinnati 14 Ohio
Dante Electric Mfg Co. Bantam Conn
DARAY—Lightolier Inc
DART DRILL—Arro Expansion Bolt Co
DATA MATRIX—Dialight Corp
DATA STRIL—Dialight Corp
DATA LITE—Dialight Corp
DATALITE—Dialight C Ohio Davidson Fan Co 213 California St Newton 58 Mass Mass
Davis (Dean W) Co—see Dormeyer Industries
Davis Electric Co 28 Parker St Wallingford Conn
Davis Mfg Co Inc 1500 S Mclean Blvd Wichita Davis Mfg Co Inc 1500 S Mclean Blvd Wichita Kans
Day-Brite Lighting Inc 6260 N Broadway St Louis 15 Mo
DAY-LINE—Day-Brite Lighting Inc Day-Ray Products Inc 1133 Mission St South Pasadena Calif
DALANITE—Price Bros Inc DAYLUME—Day-Brite Lighting Inc DAYSTAR—Lighting Products Inc DAYSTAR—Lighting Products Inc Daystrom Inc Weston Instruments Div 614 Frelingnuysen Ave Newark 12 NJ
Dayton Electric Laboratory—see Delco Products Div General Motors Corp
Dayton Electric Mfg Co 126 S Dakley Blvd Chicago 12 III
Dayton Industrial Products Co Melrose Park III
Dayton Industrial Products Co Melrose Park III
Dayton Drecision Mfg Co 213 N Becket St Dayton 3 Ohio
Dayton Precision Mfg Co 237 Gilbert Ave Cincinnati 6 Ohio
DAZIC—Winterburn Mfg Co
Dazor Mfg Corp 4481-99 Duncan Ave St Louis 10 Mo
DAZIC—Tro Expansion Bolt Co MO
DAZY—Arro Expansion Bolt Co
DE-FROST-IT—Paragon Electric Co
DE-ION—Westinghouse Electric Corp
DE-LUXE—Premax Products Div Chisholm-Ryder Co Inc
DEAN—Solar Light Mfg Co
DeBothezat Fans Div American Machine & Metals Inc
East Moline III
DECALS—Chicago Decalcomania Co
DECATHLON—Litecraft Mfg Corp
DECORALITE—Miller Co
DECRO-LITE—Westinghouse Electric Corp Lamp Div

DEFENSE LIGHT—Electric Cord Co
DeJur-Amsco Corp 4501 Northern Blvd Long Island
City 1 NY
DEKORON—Republic Steel Corp
Delco Products Div General Motors Corp 329 E 1st
St Dayton 1 Ohio
DELTA—L & P Lighting
Delta Chemical Works Inc 23 W 60 St New York 23 NY
Delta-Star Electric Co—see Delta-Star Electric Div
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III
Delta-Star Electric Div Hill Transformer Works H K
Porter Co Inc 1030 Washington St San Carlos
Calif Delta-Star Electric Div Hill Transformer Works H K
Porter Go Inc 1030 Washington St San Carlos
Calif
DELTABESTON—General Electric Co
DELTABESTON—General Electric Co
DELTABESTON—General Electric Co
DENEL—Electric Cort Co
DEMECO—Dayton Electric Mfg Co
DEMISTED—Parcision Thermometer & Bedford Ohio
DENSHEATH—Anaconda Wire & Cable Co
DENSHEATH—Anaconda Wire & Cable Co
DENSTROL—Precision Thermometer & Instrument Co
DENSTROL—Precision Thermometer & Instrument Co
DEPSITROL—Anaconda Wire & Cable Co
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DEPSITROL—Anaconda Wire & Cable Co
DEPSITROL—Anaconda Wire & Cable Co
DEPSITROL—Anaconda Wire & Cable Co
DEPSITROL—Precision Thermometer & Instrument Co
DETECTION—Prival Fight & Equipment Co
DESIGNER GROUP—Curits Lighting Div
Designers for Industry Inc 4241 Fuiton Picwy Cleveland 9 Ohio
DESOUTTER—Newage Industries Inc
DESPARD—Pass & Seymour Inc
DESPARD— Div Electric Furnace Div Kuhiman Electric Co 11400 State Fair Ave Detroit Mich Detroit Hoist & Machine Co 8292 Morrow St Detroit 11 Mich Detroit Industrial Products Co—see Gardner Products Detroit Lubricator Co—see American-Standard Controls
Div
Detroit Sheet Metal Co—see Young Bros Co
Detroit Sintered Metal Corp—see Bunting Brass &
Bronze Co
Detroit Sintered Metal Corp—see Bunting Brass &
Bronze Co
DETROITER—Detroit Hoist & Machine Co
Detroit Sintered Metal Corp—see Bunting Co—see
Devalting Co 300 Phillips Ave Toledo 1 Ohio
DeWalt Div American Machine & Foundry Co—see
Dewalt Inc
DeWalt Inc Fountain Ave Lancaster Pa
Dewalt Inc Fountain Ave Lancaster Pa
Dewalt Inc Fountain Ave Lancaster Pa
DeWalt Products Corp—see DeWalt Inc
DEXTRA LITE—Swivelier Co Inc
Di-Acro Corp 427 Eighth Ave Lake City Minn
DI-CLAD—Continental-Diamond Fibro
DI-EL-ITE—Railroad Accessories Corp
DI-EL-ITE—Railroad Accessories Corp
DI-EL-ITE—Railroad Accessories Corp
DI-FORGE—Diamond Expansion Bolt Co Inc
DI-FORGE—Diamond Expansion Bolt Co Inc
DI-FORGE—Diamond Expansion Bolt Co Inc
DIACTOR—General Electric Co
DIAL-IN—Auth Electric Co Inc
DIAL-A-FLe—General Control Co
DIAL-IN—Auth Electric Co Inc
DIAL-CO—Dialight Corp
DIALS SAW—Erwood Inc
DIALCO—Dialight Corp
DIALCO—Dialight Corp
DIALCO—Dialight Corp
DIAMOND—Cannonn Electric Co
DIAMCLO—Dialight Corp
DIAMMIDD—Damond Expansion Bolt Co Inc
DIAMMOND—Gane Electric Mrg Co Inc
DIAMMOND—Ganes Diamond Col and
Horseshoe Co
DIAMMOND—Ganes Diamo Detroit Lubricator Co—see American-Standard Controls
Div III
DIAN-IN—Auth Electric Co Inc
Dice (J W) Co Englewood NJ
Dicke Tool Co 1201 Warren Ave Downers Grove III
Dickey-Grabler Co 10302 Madison Ave Cleveland 2
Ohio Ohio
Diehl Mfg Co 1187 Finderne Ave Somerville NJ
DIELLUK—Prescolite Mfg Corp
Dietz (Henry G) Co Inc 12-16 Astoria Blvd Long
Island City 2 NY Island City 2 NY
DIFFUSO—Appleton Electric Co
DIGIMOTOR—Ledex Inc
DIGITRONIC—Weltronic Co
DILECTO—Continental-Diamond Fibre
DIIIIn (Frank W) Corp 315 W Adams Blvd Los
Angeles 7 Calif
DIM-A-LITE—Minneapolis-Honeywell Regulator Co DIM-A-LIE—minneapois-noneyweii Regulator Co Dings Brakes Inc 4740 W Electric Ave Milwaukee 46 Wis DIP-PAK—Fidellty Chemical Products Corp DIRECT-A-CALL—Simpson Mfg Co Inc DIRECTOLITE—Line Material Industries

DIRECTOR—Industrial Lamp Corp
DIRECTROL—Automatic Control Co
DIRECTRON—Sanford Miller Co Inc
DISCOVERER—York Div Borg-Warner Corp
DISCOVERER—York Div Borg-Warner Corp
DISINFECTAIRE—Art Metal Lighting Div
DISKONECT—Appieton Electric Co
DISPLAYOLITE—Ruby-Philite Corp
Distribution & High Line Specialties Co 2100 Del
Norte St Louis 17 Mo
DITCH MIDGET—Mercury Hydraulics
DITCH WITCH—Charles Machine Works Inc
DIVCO—Division Lead (Co
DIVIDOHM—Ohmite Mfg Co
DIVIDO Dixie Radiant Glassheat Co—see Dixie Raydiant Electric Heat Corp
DIXIE RAV—Dixie Raydiant Electric Heat Corp
DIXIE RAV—Dixie Raydiant Electric Heat Corp
DIXIE RAV—Dixie Raydiant Electric Heat Corp
Dixie Raydiant Electric Heat Corp 66 Eleventh St
NE Atlanta 9 Ga
Dicco Div Diordievic Engineering Co 1933 N Damen
Ave Chicago 47 II
D'LUX LINE—White-Rodgers Co
DO-ALL—Wodack Electric Tool Corp
DO-ALL—Wodack Electric Tool Corp
DO—ALL—State Welding Alloys Co Inc
Dockson Corp—3839 Wabash Ave Detroit 8 Mich
Doclcam Corp—see Minneapolis-Honeywell Co Boston
Div
Div Group Corp. Book Divineapolis-Honeywell Co Boston
Div Div Group Corp Corp St Long Beach 5 Califf Doelcam Corp—see Minneapolis-Honeywell Co Boston Dlv Dolco Mfg Co 2350 Curry St Long Beach 5 Dolph (John C) Co—Monmouth Junction NJ DOME ALZAK—Guth (Edwin F) Co DOMEXX—Lightolier Inc DOMEXX—Lightolier Inc Dominion Electric Corp 150 Elm St Mansfield Ohio Dongan Electric Mfg Co 2987-3001 Franklin St Detroit 7 Mich DONUT—Associated Research Inc DONWOOD—Sierra Electric Corp Doors & Operators Inc—see Quincy Mfg Co Dormeyer Industries 3418 Milwaukee Ave Chicago 41 Ill Dormeyer Industries 3418 Milwaukee Ave Universe 41 III Dorsey (John E) Co 570 E First St Boston 27 Mass Mass DOS-LUG—Dossert Mfg Corp DOSLOY—Dossert Mfg Corp Dossert Mfg Corp 249-255 Huron St Brocklyn 22 DOSLOY—Dossert Mfg Corp
Dossert Mfg Corp
DOSSON—Dossert Mfg Corp
DOSSON—Dossert Mfg Corp
DOSSON—Dossert Mfg Corp
DOSSON—Dossert Mfg Corp
DOSULON—Dossert Mfg Corp
DOSULON—Dossert Mfg Corp
DOSULON—Dossert Mfg Corp
DOUBLE ENCINEERED—Metalectrics Inc
DOUBLE ENCINEERED—Wetalectrics Inc
DOUBLE—ROGINEERED—Wetalectrics Inc
DOUBLE—Dons—Marwille
DOWBLET—Johns—Marwille
Dow Corning Corp Midland Mich
DOWNLITE—Rambusch Decorating Co
Doyle U E Co 1220 W 6th St Cleveland 13 Ohio
DOYNE LITE—Rambusch Decorating Co
Doyle Vacuum Cleaner Co 234 Stevens St S W Grand
Rapids Mich
DRACO—Versen (Kurt) Co
Drake Mfg Co 4626 N Olcott Harwood Heights
Chicago 31 III
DRAMALITE—Century Lighting Inc
DREADNAUGHT—Metalcraft Products Co Inc
Dreier Brothers Inc 7301 Woodlawn Ave Chicago 19
III
DREKEL—Keystone Electric Mfg Co -Keystone Electric Mfg Co DRYMALY—American Jonuer a rival of the property of the propert DUALENS—Garcy Lighting Div—Garden City Plating & William County C DUNCO-Struthers-D

Dunton ('A W) Cc 350 Kinsley Ave Providence RI DUO-DRILL—Cummins Portable Tool Div DUO-JOBMASTER—Ramset Fastening System DUOCARB—Driver (Wilbur B) Cc DUOCONE—Lightolier Inc DUOLET—Millerbernd Mfg Co DUOTROL—Automatic Control Co DUPLEX—Newark District Telegraph Co DUPA CRIMP—Anderson Electric Corp Dura CRIMP—Anderson Electric Corp Dura CRIMP—Anderson Electric Corp Dura CRIMP—Anderson Electric Corp S NJ Control Co. S NJ Control C Dura Electric Lamp Co Inc 62 E Bigelow St Newark B KJ

DURA GRIP—Anderson Electric Corp

DURA-1AP—Anderson Electric Corp

DURA-1FMP—General Biover Co

DURA-1EMP—General Biover Co

DURA WILD—Anderson Electric Corp

DURA-1EMP—General Biover Co

DURA WILD—Anderson Electric Corp

DURABAKE—S & C Electric Corp

DURABAKE—Seager Standard Carbon Co

DURACO-B—Anacanda Wire & Cable Co

DURACORD—Anacanda Wire & Cable Co

DURALER—Duray Fluorescent Mfg Co

DURALER—Duray Fluorescent Mfg Co

DURALIEM—Anaconda Wire & Cable Co

DURALIEM—Anaconda Wire & Cable Co

DURALIEM—Concorda Wire & Cable Co

DURALICT—Safe-T-Mike Corp

DURAMATIC—Dura Electric Lamp Co Inc

DURAN MFG Co 1900 N Buffton St Milwaukee 1

Wis

NIBAPERIF —Anaconda Wire & Cable Co Wis
DURAPRENE—Anaconda Wire & Cable Co
DURASEAL—Anaconda Wire & Cable Co
DURASEAL—Anaconda Wire & Cable Co
DURASHEATH—Anaconda Wire & Cable Co
DURATACH—Wheeler Reflector Co
DURATRAK—General Radio Co
DURAY Fluorescent Mfg Co 3318 W Montrose Ave
Chicago 18 III
DUREX—Duro-Test Corp
DUREX—Wheeler Reflector Co
DURIUM—Brundy Corp
DURO-BITE—Duro Fittings Co DURIUM—Brunoy Corp DURO-BITE—Duro Fittings Co Duro Fittings Co 2210 S Davie Ave Los Angeles 22 Calif DURO-FLEX—Duro-Test Corp DURO-HUB-Duro Fittings Co DURO-LET Duro Fittings Co Duro Metal Products Co Kildare & Schubert Sts Duro Metal Products Čo Kildare & Schubert Sts Chicago III
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ
DUROC—Cellomatic Battery Corp
Durolet Mig Co—see Red Seal Electric Co
DUSTIFOE—Mine Safety Appliances Co
DUSTIFE Adam (Frank) Electric Co
DUTCH BOY—Mational Lead Co
DUTRAX—Anaconda Wire & Cable Co
DUTWASTER—Master Electric Div Reliance Electric & Froilegering Co DUTYMASTER—Master Electric Div Reliance Electric & Engineering Co
DUWEL—Electro Engineering Products Co Inc
DUZ-ALL—Siebring Mfg Co
DVILSET—U S Expansion Bolt Co
Dwyer (F W) Mfg Co Woodland at Greenwood (PO
Box 373) Michigan City Ind
DYCAP—Electro Dynamics Corp
DYMAORILL—Milwauke Electric Tool Corp
DYNA-TRONIC—Gisholt Machine Co
DYNA-TRONIC—Oynamatic Div
DYNACHROME—Whitiney Blake Co
DYNALTE—Compoc Corp
Dynamatic Div Eaton Mfg Co
State Wis Dynamatic Div Eaton Mig Co 3122 14th Ave Rend Sha Wis Sha Wis DYNAMIC BETA—Hickok Electrical Instrument Co DYNAMOTIVE—Automatic Transportation Co DYNAPOWER—Crescent Co Inc DYNAPOWER—Crescent Co Inc DYNAPRENE—Whitney Blake Co DYNARSEAL—Whitney Blake Co DYNASEAL—Whitney Blake Co DYNASEAL—Whitney Blake Co DYNASEAL—Whomey Blake Co DYNASEAL—Whomey Blake Co DYNASEAL—Whomey Blake Co DYNASEAL—Dynamatic Div DYNATACH—Electric Tachometer Corp DYNATROL—Automation Products Inc DYNETRIC—Westinghouse Electric Corp DYNORGRAPH—Annis (R B) Co DYNOGRAPH—Annis (R B) Co DYNOGRAPH—Annis (R B) Co DYNOGRAPH—Annis (R B) Co

E

E-LITE—Guth (Edwin F) Co
EC&M—Square D Co Electric Controller & Mfg Div
E J S Lighting Corp 321 E Pico Blvd Los Angeles
21 Calif
EMC—Howard Industries Inc
ERP—Wallace & Tiernan Inc
ETC Inc 990 E 67 St Cleveland 3 Ohio
EZ—Henderson Electric Co
E-Z-Penn-Union Electric Corp
E-Z-CODE—Westline Products Div Western Lithograph
Co
E-Z CUTTER—Collins Machinery Corp
E-Z SERVICER—Wiely (R & W) Inc
E-Z STRIPPER—Ideal Industries Inc
E-Z TALK—Simpson (Mark) Mfg Co Inc
EAGALOK—Eagle Electric Mfg Co Inc
Eagle Electric Mfg Co Inc
Eagle Electric Mfg Co Inc
Eagle Electric Mfg Co Bridge Plaza South
Long Island City 1 NY
Eagle Mfg Co 3508 Avalon Blvd Los Angeles 11
Calif
Calif
Califocation Council Council Color Co

Earl (H W) & Co 6225 S W 8th St Miami 44 Fla Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY Early (Edward E) Co 1129 5th St N W Canton 3 Ohio Ohio
Earthworm Boring Machine Inc 1415 14th St (P O
Box 1100) Santa Monica Calif
Easter Products Inc P O Box 587 Ypsilanti Mich
EASTERN—Circle F Mfg Co
Eastern Insulated Wire Corp Trenton NJ
Eastern Specialty Co 3617 N 8th St Phila 40 Pa
Eastern Tube & Tool Co Inc—see Ettco Wire & Cable
Corp Eastern Insulated Wire Corp Trentom Wila 40 Pa Eastern Tube & Tool Co Inc—see Ettco Wire & Cable Corp EASTEX—Circle F Mfg Co Easy-Heat Inc 555 N Michigan St Lakeville Ind EASY TACH—Quadrangle Mfg Co EASY-HER—Gem Electric Mfg Co Inc Ebco Mfg Co 265 N Hamilton Rd Columbus 13 Ohio Ebert Electronics Corp Village 28 L1 NY ECLIPSE—Frick Co ECO—Economy Fuse Div ECOA—Equipment Corp of America ECON—Economy Fuse Div ECON—Conomy Fuse Div ECON—O-MATIC—American Pulley Co ECON-O-MATIC—American Pulley Co ECON-O-MATIC—American Pulley Co ECONO-MATIC—American Pulley Co ECONO-WAITER—Amer Industries Inc ECONALFLOOD—Appleton Electric Co ECONO-WAITE—Project Fixture Mfg Corp ECONICOM—Simpson (Mark) Mfg Co Inc ECONOFUNE—Project Fixture Mfg Corp ECONOFUNE—Simpson (Mark) Mfg Co Inc ECONOFUNE—Simpson (Mark) Mfg Co Inc ECONOMIC—Simpson (Mark) Mfg Co Inc Economy Fuse & Mfg Co—see Economy Fuse Div Ederal Pacific Electric Co 2070 Maple St Des Plaines III Economy Fuse & Mfg Co—see Economy Fuse Div EDCO—Eyono-Dakin Co Economy Fuse & Mfg Co—see Economy Fuse Div EDCO—Eyono-Dakin Co Economy Fuse & Mfg Co—see Economy Fuse Div Ederer Engineering Co 2943 1st Awe S Seattle 4 Wash Div Ederer Engineering Co 2943 1st Ave S Seattle 4 Wash Wash
EDGE-GLO—Curtis Lighting Div
Edison Heatube Div—see McGraw-Edison Co Altima
Div
Edison (Thomas A) Industries McGraw-Edison Co
Storage Battery Div West Orange NJ
EDISON TROPIC-AIRE—McGraw-Edison Co Albion
Div Div Edmor Lamp Co Inc 1867 Flatbush Ave Brooklyn 10 NY Edmor Lamp Co Inc 1867 Flatbush Ave Brooklyn 10 NY
EDUCATOR—Lighting Products Inc Edwards Co Inc Norwalk Conn EDYCO—Electro Dynamics Corp EECO—Marvin Electric Mfg Co EFCOR—Electrical Fittings Corp EFCORLET—Electrical Fittings Corp Efficiency Electrical Afficings Corp Efficiency Electric & Mfg Co Park Ave Ext P 0 Box 30 East Palestine Offic Corp Efficiency Electric & Mfg Co Park Ave Ext P 0 Box 30 East Palestine Offic Corp Efficiency Electric & Mfg Co Park Ave Ext P 0 Box 30 East Palestine Offic Corp Inc Electric & Mfg Corp Park Ave Ext P 0 Box 30 East Palestine Offic Corp Inc Electric Sinc Electric Sinc Electric Sinc Electric Engineering Co Inc 750 S 13 St Newark 3 NJ EITHEREND-Anderson (Albert & J M) Mfg Co EITHEREND—Anderson (Albert & J M) Mfg Co EKTACOM—Fisher Berkeley Corp Elastic Stop Nut Corp of America Elizabeth Div 1027 Newark Ave Elizabeth NJ ELBENDERS—Henderson Electric Co ELBOLLIFT—Automatic Transportation Co Eldon Industries Inc—see Ungar Electric Tools Div of Eldon Industries Inc ELEC-TROL-FEED—Detta-Star Electric Div ELECTR-0-LINE—Minneapolis-Honeywell Regulator Co Industrial Div Industrial Div ELECTR-0-PULSE — Minneapolis-Honeywell Regulator Co Industrial Div
ELECTR-0-VANE—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTR-0-VOLT—Minneapolis-Honeywell Regulator Co
Electra Insulation Corp 33-30 57th St Woodside 77 Electra Mfg Co 4051 Broadway Kansas City Electra Motors Inc 1110 N Lemon St Anahe Calif Electra Motors Inc 1110 N Lemon St Anahelm Calif Electran Mfg Co 1901 Clybourn Ave Chicago 14 111 Electran Mfg Co 1901 Clybourn Ave Chicago 14 111 Electran Products Corp State & Water Sts (Box 110) St Joseph Mich ELECTRESTEEM—Electric Steam Radiator Corp Electric Products Div Electric Products Div Electric Products Div Electric Products Div Brooklyn 35 NY Electric Fix Co Roselle III Electric Arc Inc 152 Jelliff Ave Newark 8 NY Electric Fix Co Roselle III Electric Arc Inc 152 Jelliff Ave Newark 8 NY Electric Controller & Mfg Co—see Square D Co Electric Controller & Mfg Div Electric Distribution Products Inc 2200 31st St S W Allentown Pa ELECTRIC DOORMAN—Electric Power Door Co Inc ELECTRIC FLOWER—Aerolux Lights Corp Electric Heating Products Inc—see Everwarm Inc Electric Hose & Rubber Co 12th & Dure Sts Wil-mington Del

Electric House Number Co 8670 W Washington Blvb Culver City Calif Electric Indicator Co Inc Camp Ave Springdale Conn Electric Jobbers Suppliers Corp—see EJS Lighting Corp Electric Lighting Sales Inc P 0 Box 1907 Stockton Calif Lyminus Sales Inc P D Box 1907 Stockton Calif ELECTRIC-Lyminus Ceilings Inc Electric Machinery Mfg Co 800 Central Ave Minne-Electric Machinery Mfg Co 800 Central Ave Minne-Electric Materials Co Box 390 North East Pa Electric Motor Corp—see Howard Industries Inc Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind Electric House Number Co—see Electric House Number Co Electric Power Door Co Inc 2127 E Lake St Minne-apolis 7 Minn Electric Power Plants Corp—see U S Electric Motor Co Electric Porducts Co 1725 Clarkstone Rd Cleveland 12 Ohio 12 Ohio
Electric Railway Equipment Co—see Elreco Corp
Electric Railway Improvement Co—see Erico Products Electric Railway Improvement Co—see Erico Products
Inc.
Electric Re-Light Co Uniman Pl at S Goodman
Rochester 20 NY
Electric Regulator Corp
Electric Service Co—see Delta-Star Electric Div H K
Porter Co Inc
Electric Service Systems Inc 1330 Quincy St N E
Minneapolis 13 Minn
Electric Soldering Iron Co Inc West Elm St Deep
River Conn
Electric Specialty Co 211 South St Stamford
Electric Steam Radiator Corp 1 Electric Ave Paris
Ky Electric Switch Corp 2320 S Tibbs Ave (P 0 Box 41037) Indianapolis 41 Ind Electric Tachometer Corp 68th & Upland Sts Phila 42 Pa Electric Tube Products 74-16 Grand Ave Maspeth NY Electric Tubular Products Inc-see Electric Tube Products
Flectrical Engineers Equipment Co 25th Ave & Division St Melrose Park III
Electrical Facilities Inc—see Knopp Inc
Electrical Fittings Corp 37-50 57th St Woodside 77 NY
Electrical Mfg Co 425 Lake Ave Racine Wis
Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 III
Electrical Service Co—see Esco Mfg Co
ELECTRICITY'S SAFETY VALVE—Bussmann Mfg Div
ELECTRICITUBE—Mark (Clayton) & Co
ELECTRICTUBE—Mark (Clayton) & Co
ELECTRIC—Minneapolis-Honeywell Regulator Co Industrial Div
ELECTRO—Dunton (M W) Co
ELECTRO—Dunton (M W) Co
ELECTRO—CAM—Warner Electric Brake & Clutch Co
Electro Compound Co 4145 W 150 St Cleveland 35
Ohio UNIO
ELECTRO-COOLER—Allis-Chalmers Mfg Co
Electro Devices Inc 4648 Easton Ave St Louis 13
Mo Mo
Electro Devices Inc 580 Main St Wilmington Mass
Electro Dynamic Div General Dynamics Corp 163
Ave A Bayonne NJ
Electro Dynamics Corp 4917 St Elmo Ave Bethesda
14 Md
Electro Engineering Products Co Inc 609 W Lake St
Chicago 6 III
Electro Engineering Works 401 Preda St San
Leandro Calif Leandro Calif Electro-Graphic Graver Co P O Box 265 Toledo 1 Ohio
ELECTRO-FLO—Hays Mfg Co
ELECTRO-GARD—Perfeclite Co
ELECTRO-LARM—Electro Devices Inc
Electro Lift Inc 204 Sargeant Ave Clifton NJ
Electro Lighting Corp 1536 S Paulina St Chicago 8 Electro Luminaire Corp—see Electro Lighting Corp ELECTRO MAT—Interstate Rubber Products Corp Electro Mechanical Devices Co—see Nankervis (Geo L) Co Electro-Mechanical Instrument Co 8th & Chestnut Sts Perkasie Pa Electro-Mechano Co 241 E Erie St (EM) Milwaukee 2 Wis ELECTRO-PANE—Electro Devices Inc Electro Powerpacs Inc 5 Hadley St Cambridge 40 Mass
ELECTRO-PROBE—Erwood Inc
Electro-Products Mfg Co—see Electro-Ray Mfg Co
Electro-Ray Mfg Co 8310 N E Highway 99 VancouWach wer Wash
ELECTRO-SHEAVE—Warner Electric Brake & Clutch Co
Electro Silv-A-King Corp—see Electro Lighting Corp
Electro-Snap Switch & Mfg Co—see Controls Co of
America Control Switch Div
Electro Switch Corp—King Ave Weymouth 88 Mass
Electro-Technical Products Div Sun Chemical Corp
113 E Centre St Nutley 10 NJ
ELECTRO-WIND—Allen Cooler & Ventilator Inc
ELECTRO-WIND—Milen Cooler & Ventilator Inc
ELECTRO-WIND—Milen Cooler & Ventilator Inc Electroflow Inc—see American Electronics Inc ELECTROFLUID—Link-Belt Co ELECTROLETS—Killark Electric Mfg Co Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio Ohio
Electromaid Corp—see Can Arm Corp
ELECTROMATIC—National Time & Signal Corp
ELECTROMATIC—Siebring Mfg Co
ELECTROMATIC—Hays Mfg Co
ELECTROMITE—Hays Mfg Co
Electromade Div Commercial Controls Corp P 0 Box
1052 Rochester 3 NY
ELECTRONIC BUTLER—Simpson (Mark) Mfg Co Inc

Electronic Center—see Dalmotron Co
Electronic Control Corp 15341 Dale Detroit 23 Mich
ELECTRONIC-DIRECTOR—Simpson (Mark) Mfg Co Inc
Electronic Measurements Co Inc Lewis St & Maple
Ave Eatontown NJ
ELECTRONIC WITOH—Fisher Research Laboratory Inc
Electronics Corp of America One Memorial Dr Cambridge Mass
ELECTRONIK—Minneapolis-Honeywell Regulator Co
Industrial Div Industrial Div
ELECTROPULT—Westinghouse Electric Corp
Electrosnap Corp—see Controls Co of America Control
Switch Divp ELECTROSTART—Lake Shore Electric Corp
ELECTROSTART—Lake Shore Electric Corp
ELECTROSTRIP—I-T-E Circuit Breaker Co
Electric Products Div
Electrovector Inc 475 Flushing Ave Brooklyn 5 New Electrovector Inc 475 Flushing Ave Brooklyn 5 New York
Electrovert Inc 124 E 40 St New York 16 NY
ELECTROWELD—Electric Arc Inc
ELECTRUNITE—Republic Steel Corp
ELEGANCE—White-Rodgers Co
ELEMEX—Line Material Industries
ELFCO—Everglow Lighting Fixture Co Inc
Elgin National Watch Co Electronics Div 2435 N
Naomi St Burbank Galif
ELIED—Farrelloy Co
ELINTO—Electric Indicator Co Inc
ELIPSO—Appleton Electric Co
ELPTICONE—Art Metal Lighting Div
ELIPTOR—Revere Electric Mig Co
ELIPTIOR—Revere Electric Mig Co
Elite Glass Co Inc 111 W 22nd St New York 11
NY NY
Elite Import Co—see Elite Glass Co Inc
Eliza Metal Products Co Box 408 Bridgeville Pa
ELJAY—Segil (L J) Co
ELKOLOY—Mailory (P R) & Co Inc
ELKONITE—Mailory (P R) & Co Inc
ELKONITE—Mailory (P R) & Co Inc
ELKONITE—Mailory (P R) & Co Inc
Ellanar Chemical Co—see London Chemical Co Inc
Ellanar Chemical Co—see London Chemical Co Inc
ELLARM—Ellenco Inc
ELLBELL—Ellenco Inc
Ellenco Inc 3322 M St N W Washington 7 DC
Elliott Co Jeannette Pa
Elliott Electric Mfg Corp 50-30 98th St Corona 68
NY Elliott Electric Products Co-see Elliott Electric Mfg Corp ELLIPTI-FLOOD—Electro Lighting Corp ELLIPTI-FLOOD—Electro Lighting Corp
ELLITE—Ellenco Inc
Ellman Co—see Ellenco Inc
Ellmann Engineering Co—see Ellenco Inc
ELPAR—Elwell-Parker Electric Co
ELRAD—Westchester Brickote Products Co Inc
Elreco Corp 2000 Central Ave Cincinnati 14 Ohio
ELTAP—Burndy Corp
ELTEX—Electro-Technical Products Div Sun Chemical
Corp Corp Elwell-Parker Electric Co 4319 St Clair Ave Cleve-Elweri-Parker Electric Co 4-19 St clair Ave Cleveland 3 Ohio
Emarco Corp 1950 Neva Drive Dayton 14 Ohio
EMCO—Ent Electric Mfg Corp
EMCO—Ender-Monarch Corp
EMCO—Ender-Monarch Corp
EMCO—MATIC—Dixie Controller Inc
Emerson Apparatus Co 171 Tremont St Melrose
Mass Emerson Electric Mfg Co 8100 Florissant Ave St Louis 36 Mo Emerson-Imperial Lighting Co Loyalhanna Park Latrobe Pa Emerson Plastics Corp 1383 Seabury Ave Bronx 61 NY NY
Emerson-Pryne Co Towne Ave at Monterey (P 0 Box 698) Pomona Calif
EMICO—Electro-Mechanical Instrument Co
EMPIRE—Cam-Lok Div Empire Products Inc
EMPIRE—Diamond Expansion Bolt Co Inc
Empire Corp 1566 S 83rd St Milwaukee 14 Wis
Empire Products Inc—Cam-Lok Div Empire Products
Inc. Empire Switchboard Co Inc 810 Fourth Ave Brook-lyn 32 NY Enameled Metals Co—see Pittsburgh Standard Con-Enameled Metals Co—see Pittsburgh Standard Cr duit Co
ENAMELITE—Republic Steel Corp
ENAMELITE—Mark (Clayton) & Co
ENCLOSURES UNLIMITED—Burns (James F) Co
Ender-Monarch Corp 141 Lanza Ave Garfield NJ
ENDON—Pollack Luminescent Corp
ENDON—Voltarc Tubes Inc
ENDOVAL—Revere Electric Mfg Co
ENDULATOR—Rusgreen Mfg Co
ENDULATOR—Rusgreen Mfg Co
ENDURPKENE—General Insulated Wire & Cable Co
ENDURPKENE—General Insulated Wire Works
Engelhard (Charles) Inc.—see Engelhard Industries In ENDURPIE—Descent insulated wire Works
Engelhard (Charles) Inc—see Engelhard Industries Inc
Engelhard Industries Inc 113 Aster St. Newark S
New Jersey
Engelhard Industries Inc Industrial Equipment Div
Instruments & Systems See 850 Passaic Ave East
Newark NJ
ENGINATORS—Waukesha Motor Co
ENTERITE—General Cable Corp
ENVOY—Keystone Electric Mfg Co
ENTITE—General Cable Corp
ENVOY—Keystone Electric Mfg Co
CONITE—Kaiser Aluminum & Chemical Sales Inc
EPCO Electronics Inc 140 Liberty St. NY 6
EPCO ELECTORIS Inc 140 Liberty St. NY 6
EPOSET—Hardman (H V) Co Inc
EPOXIGLAS—Chance (A B) Co
Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio
ERECT-A-LIFT—Allied Mfg & Sales Co
ERICKSON—Thomas & Betts Co ERECT-A-LIFT—Allied Mfg & Sales Co ERICKSON—Thomas & Betts Co Erickson Power Lift Trucks Inc St Anthony Blvd & University Ave NE Minneapolis 18 Minn Erickson Special Equipment Mfg Co—see Erickson Power Lift Trucks Inc

Erico Products Inc 2070 E 61 Place Cleveland 3
Ohio
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio
Ericson Mfg Co 564 Union Trust Bidg Pittsburgh
19 Pa
Erie Maileable Iron Co Kondu Div—see Kondu Corp
Erie Sales & Mfg Co—see Erie Glass Mfg Co
Erie Tool Works 12th & Liberty Sts Erie Pa
Erwood Inc 1770 Berteau Ave Chicago 13 III
ESCO—Electric Speciality Co
ESCO—Electric Systeiality Co
ESCO—Electric Systeiality Co
ESCO—Electric Systeiality Co
ESCO—Electric Systems Inc
ESISIC—Electric Solediring Iron Co Inc
ESS—Electric Service Systems Inc
ESSI Instrument Company—see Photomation Inc
Ess Instrument Company—see Photomation Inc
Essex Wire Corp Wire & Cable Div 2601 S Adams
Marion Ind
ESSTRON—Electric Service Systems Inc
ESTANE—Goodrich (B F) Chemical Co
Esterline-Angus Instrument Co P O Box 596 Indianapolis 6 Ind
Esty Mfg Co 112 S Sangamon St Chicago 7 III
ETTCO-FLEX—Ettco Wire & Cable Corp
ETTCO-PLASTIC—Etto Wire & Cable Corp
ETTCO-PLASTIC—Etto Wire & Cable Corp
ETTCO-PLASTIC—Etto Wire & Cable Corp
Ettco Wire & Cable Corp
Everett (E A) Inc—see Railroad Accessories Corp
Everety (E A) Inc—see Railroad Accessories Corp
Everety (E A) Inc—see Railroad Accessories Corp
Everet Corp 127 Marbledale Rd (P O Box 485)
Tuckaho NY
Excellent Service Co Inc 2113 S Western Ave
CNELL—Superior Electric

F

FA—Adam (Frank) Electric Co
F & F—Trent Inc
F P—Mallory (P R) & Co Inc
F P —Supara D Co
F W D Corp 105 E 12 St Clintonville Wis
Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III
FAIRLEADER—Barry (William B) Co
FAIRWAY—Day-Brite Lighting Inc
FAIRCON—Guth (Edwin F) Co
FAIRCHAY—Day-Brite Lighting Inc
FAIRCON—Guth (Edwin F) Co
FAIRCHAY—Box 422 Milwaukee 1 Wis
Faistrom Co 62 Faistrom Court Passaic NJ
FAMOUS—Goshen Churr & Ladder Inc
FAN-GLO HEETAIRE—Markel Electric Products Inc
FAN-PAC—General Blower Co
FAN-FAC—General Blower Co
FAN-PAC—General Blower Co
FAN-PAC—Genera

Farmer Electric Do-see Failing
Inc
Farmer Electric Products Co Inc 2300 Washington St
Newton Lower Falls 62 Mass
PARMOTOR—Westinghouse Electric Corp
FARMSTARTER—Westinghouse Electric Corp
Farrelloy Co 1245 N 26th St Phila 21 Pa
FAS-TIN—Farrelloy Co
Fasco Industries Inc Davis & Toppin Sts Rochester 2
NY NY
Fasform Div Heller Roberts Mfg Corp 6115 Carnegie
Ave Cleveland 1 Ohio
FASHION—White-Rodgers Co
FASHION PLATE—Bryant Electric Co
Fast-Lok Mfg Co Ash St at Bedford Bridgeport 5 Fast-Lok Mfg Co Ash St at Bedford Bridgeport 5
Cann

FASTHOLD—Mitchell Rand Insulation Co
Fastway Fasteners Inc 1676 E 28 St Lorain Ohio
FATHOMETER—Raytheon Mfg Co
FAULTHNDER—Parr Mfg Corp
FAULTMASTER—Hubbard & Co
FEATHERETER—Hubbard & Co
FEATHERETER—Hubbard & Co
FEATHERETER—Hubbard & Co
FEATHERWEIGHT—Goldak Co Inc
FEATHERWEIGHT—Goldak Co Inc
FEATHERWEIGHT—Wing (L J) Mfg Co
Fedders-Quigan Corp—see Fedders Corp
FEDERAL—Dillin (Frank W) Corp
FEDERAL—Dillin (Frank W) Corp
Federal Electric Co Inc—see Federal Sign & Signal
Corp
Federal Electric Products Co—see Federal Pacific
Electric Co Federal Enterprises—see Federal Sign & Signal Corp Federal Enterprises—see Federal Sign & Signal Corp Federal Lighting Corp 1425 Rockwell Ave Cleveland 14 Ohio Federal Lighting Corp 1425 Nockwell Ave Cleveland
14 Ohio
Federal Lighting Div—see Federal Lighting Corp
Federal Machine & Welder Co 1745 Overland Ave N E
Warren Ohio
Federal Pacific Electric Co 50 Paris St Newark 5 NJ
Federal Shock Mount Corp
New York 56 NY
Federal Sign & Signal Corp
Blue Island III
Federal Telephone and Radio Co—see ITT Components Blue Island III
Federal Telephone and Radio Co—see ITT Components
Div
Co 120 Broadway New York 5 NY
FED-IN—Square D Co
Feedrail Corp 125 Barclay St New York 7 NY
FEEDLOT—Columbia Metal Box Co
Feiler Engineering & Mfg Co 8026 N Monticello Ave
Skokie III
Felco Products Inc 8700 Ambassador Row Dallas
19 Tex
FEMCO—Fluorescent Equipment & Mfg Co
FENCE-RITE—Electric Service Systems Inc
FERALOY—Crouse-Hinds Co
FERMONT—International Fermont Machinery Co Inc
Ferrara Inc—see Webster Electric Co
FERRIMAG—crucible Steel Co of America
FERRUBRON—Carbolineum Wood Preserving Co
FIBREMAT—Minnesota Mining & Mfg Co
Irvington
Div FIBROID--Johns-Manville FIBRPLUG—Star Expansion Fidelity Chemical Products Corp 470 Frelinghuysen Ave Newark 12 NJ Fidelity Electric Co Inc 332 N Arch St Lancaster Fidelity Electric Co Inc 332 N Arch St Lancaster Pa FIEFLEX—Insulation Mfrs Corp FILTAIRETTE—General Scientific Equipment Co Finland House Lighting—see Litecraft Mfg Corp FINROD—Tutle & Kift Inc Fire Alarm Thermostat Corp 53 W 23 St New York 10 NY FIR Description 10 NY FIR Description 10 NO Chancellor Ave Newark 12 NJ
FIRE FUSE—Wind-Way Fan & Ventilator Co
FIREBAN—Taylor Fibre Co
FIREFLY—Northern Light Co
FIREYE—Electronics Corp Of America
FIRMA—Hirschman-Pohle Co Inc
First Lamp Corp—see Penetray Corp
Fischer & Porter Co 335 Warminster Rd Hatboro Pa Fisher Berkeley Corp 4224 Holden St Emeryville Calif Fisher-Pierce Co 170 Pearl St South Braintree 85 Fisher-Pierce Go Tro Form Mass Fisher Research Laboratory Inc 1961 University Ave Palo Alto Calif 5-WAY—Superior Electric Co FIXTURE FASHIONS—Moe Light Div Thomas Indus-trice Inc tries Inc FLAME STOP—Phelps Dodge Copper Products Corp FLAMENOL—General Electric Co FLAMESCENT—Duro-Test Corp FLASH—Phillips Mfg Co Inc FLASH—Phillips Mfg Co Inc FLASH-GLO—Tedear Products Co FLASHMASTER—Carpenter Mfg Co FLAVOR SEAL—Fresh'nd-Aire Div Cory Corp Fleron (M M) & Son 1220 Yardiey Rd Mo Pa Morrisville Fletcher Mfg Co Box 246 Englewood Ohio Fleur-O-Lier Mfrs 2116 Keith Bldg Cleveland 15 Ohio
FLEX-A-PLUG—General Electric Co
FLEX-A-POWER—General Electric Co
FLEX-ARC—Westinghouse Electric Corp
FLEX-ARM-Woodward Machine Co
FLEX-FIT—Charleston Rubber Co
FLEX HERMETIC—Fedders Corp
FLEX-LITE—Aero-Motive Mfg Co

Faries Lamp Div—see AOW Corp Faries Mfg Corp—see AOW Corp Farmer Electric Co—see Farmer Electric Products Co FLEX-LOCK—Keystone Electric Mfg Co
FLEX-SAF—Charleston Rubber Co
FLEX-SAFA—Charleston Rubber Co
FLEX-SAFA—Charleston Rubber Co
FLEX-SHEAR—Marvel Rack Mfg Co Inc
FLEXACM—Hatfield Wire & Cable Div Continental
Cooper & Steel Industries Inc
FLEXALAM—Gamewell Co
FLEXALL—Rome Cable Div of Alcoa
FLEXARAM—Gamewell Co
FLEXARAM—Duro-Test Corp
FLEXARM—Art Specialty Co
FLEXEARM—Art Specialty Co
FLEXEARM—Art Specialty Co
FLEXEARM—Art Specialty Co
FLEXEARM—Art Specialty Co
FLEXEARM—Columbia Wire & Supply Co
FLEXEARM—Columbia Wire & Supply Co
FLEXIFONE—Dusane Corp
FLEXIFONE—Dusane Corp
FLEXIFONE—Dusane Corp
FLEXIFONE—Busane Corp
FLEXIFONE—Superior Electric Co
FLEXILUGS—Frankel Connector Co
FLEXILUGS—Frankel Connector Co
FLEXIFONE—Alisi (Louis) Co
FLEXIFONE—Alisi (Louis) Co
FLEXIAM—Art Specialty Co
FLEXIAM—Art Specialty Co
FLEXIAM—Art Specialty Co
FLEXIAM—Art Specialty Co
FLEXIAM—Fresonics Corp
FLEXON—Fresonics Corp
FLEXON—Fresonics Corp
FLEXON—Fresonics Corp
FLEXON—Fresonics Corp
FLEXON—Fresonics Corp
FLEXON—Tensolite Insulated Wire Co Inc
FLEXON—Fresonics Corp
FLEXSHELD—American Electric Corp
FLEXSHELD—American Electric Corp
FLEXSTEEL—Utilities Service Co
FLEXITEEL—Wational Electric Corp
FLEXSTEEL—Wational Electric Corp
FLIPON—Westinghouse Electric Corp
FLIPTE—Royal Electric Corp
FLIPTE—Royal Electric Corp
FLIPTE—Royal Electric Corp
FLIPTE—Row-Westers Meter Co Inc
FLO-LINER—Wester Products Co
FLO-LIRE—Burton Mfg Co
FLO-SIG—New Jersey Meter Co Inc
FLO-LINER—Wheeler Reflector Co
FLO-SIG—New Jersey Meter Co Inc
FLO-LONG PANEL—Metalcraft Products Co
FLO-SIG—New Jersey Meter Co
FLO-SIG—Amer Industries Inc
FLO-UN-REIM—Amer Industries Inc
FLO-UN-REIM—Amer Industries Inc
FLO-UN-REIM—Amer Industries Inc
FLOW-TERM—Amer Indus Cleveland 27 Unio
Fluorescent Equipment Supply Co—see K-B Lighting
Mfg Co
Fluorescent Fixtures of California 352 Shaw Rd
South San Francisco
Fluorescent Fixtures of California 352 Shaw Rd
South San Francisco
Fluorescent Fixtures of California 352 Shaw Rd
South San Francisco
Fluorescent Fixtures of California
Fluorescent Fluorescent Mfg Co
Fluorescent Fixturescent Mfg Co
Fluorescent Fixturescent Conn
Forston Co 2117-2119 Judiway (P O Box 10231)
Houston 18 Tex
Fort Worth Steel & Machinery Co 3600 McCart St
(PO Box 1038) Fort Worth 1 Tex
FORTY-SIXTY—Curtls Lighting Div
FORWAY—U S Expansion Bolt Co
FOSTERITE—Westinghouse Electric Corp
Fostoria Corp N Main St Fostoria Onio
Fostoria Pressed Steel Corp—see Fostoria Corp
FOTA-LITE—Corning Glass Works
4 POINT—Nye Tool Co
FOUR-STAR—Johns-Manwille Four Wheel Drive Auto Co-see F W D Corp
Fox Gun Co-see Fox Products Co
Fox Products Co 4720 N 18 St Phila 41 Pa

FRAHM—Biddle (James 6) Co
FRAME GATE—Gar Wood Industries Inc
France Mfg Co 10325 Berea Rd Cleveland 2 Ohio
FRANCEFORMER—France Mfg Co
FRANCEFORMER—France Mfg Co
Francolite Co—see Federal Lighting Corp
Frankel Connector Co 27 Vestry St NY 13 NY
Franklin Electric Co Inc 400 E Spring St Bluffton
Ind
Frick Go Waynesboro Pa
Frish'nd-Aire Div Cory Corp 221 N LaSalle St
Chicago III
Frick Co Waynesboro Pa
Frick-Gallagher Mfg Co 110 S Michigan Ave WellsCondition of Maynesboro Pa
Frick-Gallagher Mfg Co 110 S Michigan Ave WellsCondition of Maynesboro Pa
Frick-Gallagher Mfg Co 110 S Michigan Ave WellsCondition of Maynesboro Pa
Fright Inc 1250 Rockaway Ave Brooklyn 36 NY
Frigidaire Div General Motors Corp 300 Taylor St
Dayton 1 Ohio
FRIGIDFLEX—Hatfield Wire & Cable Div Continental
Copper & Steel Industries Inc
Frink Corp 21 1 63rd St Brooklyn 20 NY
Frishic (NO Co 1120 E Pico Blvd Los Angeles 21
Califf
Corp 21 Gord St
Fright Corp 21 Corp
Fright Corp
Fright Corp 21 Corp
Fright Corp
Fright

G

GAC—General Alliance Corp
G-C Electronics Co 400 S Wyman St Rockford III
GE—General Electric Co
G-H—Girard Hopkins
GL—Lidseen of North Carolina Inc
GM Diesel 12400 W Outer Dr Detroit 28 Mich
GS—General Scientific Equipment Co
GSF—General Scientific Co
GALVANOLEUM—General Co
GALVANOLEUM—Mark Clayton) & Co
Galvin Mfg Co—see Motorola Communications &
Electronics Inc
GALVINOLEUM—Rust-Oleum Corp
GALVINOLEUM—Rust-Oleum Corp
GALVINOLEUM—Rust-Oleum Corp
GALVINOLEUM—General Co
GAR-LITE—Garcy Lighting Div Garden City Plating &
Mfg Co
GAR-LITE—Garcy Lighting Div Garden City
Plating & Mfg Co
Gar Wood Industries Inc
GAR SEE-LITE—Garcy Lighting Div Garden City
Plating & Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garcy Lighting Div Garden City Plating &
Mfg Co
Garden City Fan & Blower Co
Bol N Eighth St
Niles Mich
Garden City Plating &
Mfg Co—see Federal Pacific Electric
Co
Garden City Plating &
Mfg Co—see Federal Pacific Electric
Co
Garden Federate Metals Div American Smelting
&
Refining Co
Garden Federate Co
Garden City Plating &
Mfg Co

General Blower Co 8610 Ferris Ave Morton Grove General Cable Corp 730 Third Ave New York 17 NY General Cable Corp Clifton Conduit Div—see Clifton
Conduit Co
General Cement Mfg Co—see G-C Electronics Co Div
of Textron Electronics Inc
General Control Co 1200 Soldiers Field Rd Boston 34
Mass
General Controls Co 801 Allen Ave Glendale Calif
General Controls Co 801 Allen Ave Glendale Calif General Control Co 1200 Soldiers Field Rd Boston 34
Mass
General Controls Co 801 Allen Ave Glendale Calif
General Electric Co
Air Conditioning Dept Central Air Conditioner
Troup Highway Tyler Tex
Apparatus Sales Schenectady 5 NY
Chemical & Metallurgical Div Conduit Products
Dept 980 Warren Ave Niles Ohio
Circuit Protective Devices Dept 41 Woodford Ave
Plainville Conn
Commercial & Industrial Air Conditioning Dept 5
Lawrence St Bloomfeid NJ
Distribution Assemblies Dept 41 Woodford Ave
Plainville Conn
Laminated Products Dept Coshocton Ohio
Large Lamp Dept Nela Park Cleveland Ohio
Major Appliance Div Room Air Conditioner Dept
Appliance Park Louisville 1 Ky
Miniature Lamp Dept Nela Park Cleveland Ohio
Silicone Products Dept Waterford NY
Technical Products Dept Waterford NY
Technical Products Dept Electronics Park Syracuse NY
Weathertron Dept 5 Lawrence St Bloomfeid NJ
Wire & Calab Dent 1206 Po. cuse NY
Weathertron Dept 5 Lawrence St Bloomfield NJ
Wire & Cable Dept 1285 Boston Ave Bridgeport 2
Com
Wiring Device Dept 95 Hathaway St Providence
RI
General Electric Supply Co 1260 Boston Ave Bridgeport Con
General Floorcraft Inc 3630 Rombouts Ave Bronx
56 NY
General Hardware Mfg Co Inc 80 White St NY 13 66 NY General Hardware Mfg Co Inc 80 White St NY 13 General Insulated Wire Works 69 Gordon Ave Providence 5 RI General Lamps Mfg Corp—see AOW Corp General Lighting Co 248 McKibbin St Brooklyn 6 NY General Luminescent Corp—see Pollak Luminescent Corp
General Metals Inc 858 Goldsbro Greensboro NC
General Products Corp 107 Salem St Union Springs
NY NY
General Radio Co West Concord Mass
General Scientific Equipment Co Limeklin Pike &
Williams Ave Philadelphia 50 Pa
General Steel Fittings Co 1321 21st St Racine
Wisconsin
General Switch Co 45 Roebling St Brooklyn 11 New York
General Ultrasonics Co—see Acoustics Associates Inc
GENERALFLOOD—Appleton Electric Co
GENERALITER—Duro-Test Corp
GENESCOPE—Simpson Electric Co
GENIE—Alliance Mfg Co Inc
GEON—Goodrich (B F) Chemical Co
Geophysical Instrument Co—see Georator Corp
GEOPRENE—General Electric Co Wire & Cable Dept
Georator Corp Manassas Va
GEORGE—Clark (George P) Div Cragin & Wilkins Co
Inc Geringer & Sons Mfg Corp Peekskill NY GESCO—General Electric Supply Co Gets-A-Lite Co 3865 N Milwaukee Ave Chicago 41 III GIANT—Burgess Battery Co Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif Gibson Mfg Co 1919 Piedmont Circle N E Atlanta Ga edibson Refrigerator Co 515-615 W William St Greenville Mich GILL—Progress Mfg Co Inc GILL—Progress & Fixture Co Philadelphia 34 Pa GILL-GLO—Gill Glass and Fixture Co Girard-Hopkins 1000 40th Ave Dakland 1 Calif Gisholt Machine Co 1245 E Washington Ave Madison 10 Wis 10 Wis GISHOLT MASTERLINE—Gisholt Machine Co Glade Mfg Co 1632 W 75 Pl Chicago 20 III GLAS-VAR—Electro-Technical Products Div GLASBAKE—MicKee Div Thatcher Glass Mfg Co Inc GLASBAKE—McKee Div Thatcher Glass Mfg Co Inc GLASPUM—Atlas Asbestos Co GLASSEAL—Pyramid Electric Co GLASSEAT—Continental Radiant Glass Heating Corp GLASSURFACEO—Kirlin Co GLASSURFACEO—Kirlin Co GLASTERRA—Chase & Sons Inc Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio GLAZON—Triangle Conduit & Cable Co Inc Gleason-Avery Inc 45 Aurelius Ave Auburn NY Gleason (J. 1). & CO—see Gleason Reel Corp Gleason Reel Corp [740 N Plankinton Ave Milwaukee 3 Wis Gleason (J L) & Co—see Gleason Reel Corp Gleason Reel Corp [740 N Plankinton Ave Milwaukee 3 Wis Gleason Sales Co Inc 5809 W Montrose Ave Chicago 34 III Glen Co—see M & T Welding Products Corp Glen Equipment Co—see M & T Welding Products Corp Glen Roberts Co—see M & T Welding Products Corp GLENDALE—King Refrigerator Corp GLENDALE—King Refrigerator Corp Glen Roberts Heater Corp 374 Jelif Ave Newark N. Glides All ITE—Globe Lighting Products Inc Glides All ITE—Globe Lighting Products Inc NJ
CLIDE-A-LITE—Globe Lighting Products Inc
GLO GUARD—Hubbard & Co
ID-Lite Instrument Co 152 Watson Ave Newark
ID-LITE NJ
GLO-PAINT—Vemaline Products Co
GLO PLUG—Industrial Devices Inc
GLO-RAY—Curtis Lighting Div Curtis-All Brite
GLO-RITE—Phillips (Oscar) Co Globar Plant (Refractories Div) Carborundum Co Niagara Falls NY

Globe Industries Inc 1784 Stanley Ave Dayton 4 Globe Industries Inc 1784 Stanley Ave Dayton 4
Ohio
Globe Lighting Products Inc 1710 Flushing Ave
Brooklyn 37 NY
GLOMASTER—Emerson-Pryne Co
GLOW LITE—Spencer Industries
GLOWLITE—Spencer Industries
GLOWLITE—General Electric Co
GCTPTAL—General Electric Co
GOGFTER—Revolvator Co
Godfrey Mfg Co 1633 N Halsted St Chicago 14 III
GOLD—Kaiser Aluminum & Chemical Sales Inc
GOLD CROWN—Ploneer Gen-E-Motor Co
GOLD MEDAL—Patent Scaffolding Co Inc
GOLD-O-MATIC—Luxor Lighting Products Inc
Goldak Co Inc 1544 W Glenoaks Blvd Glendale 1
Calif Idak Calif
Goldberg & O'Brien Electric Co—see Ther Electric &
Machine Works
GOLDEN-D—Cannon Electric Co
GOLDEN SUNBURST—Globe Lighting Products Inc
GOLLATH—David's Gloves Inc
Good-All Electric Mfg Co 112 W First St Ogallala Neb Good Mfg Co Inc 1015 N Halsted St Chicago 22 Ill Goodall Rubber Co 493 Whitehead Rd Trenton NJ Goodrich (BF) Chemical Co 3135 Euclid Ave Cleveland 15 Ohio GOPI—Bronze Bearings Inc Goshen Churn & Ladder Inc Goshen Churn & Ladder Inc Goshen Churn & Ladder Inc Govern Charles Inc Govern Covern C Mass
GRAIN-ORIENTED—Vickers Inc
GRAMIX—United States Graphite Co
GRATELITE—Guth (Edwin F) Co
GRATELITE—Guth (Edwin F) Co
Gray Instrument Co Mill Rd Andalusia Pa
Graybar Electric Co Inc 420 Lexington Ave NY 17 NY
Grayhill Inc 551 Hillgrove Ave La Grange III
GREA-NO—Great Northern Mfg Corp
Great Northern Mfg Corp 1056 N Wood St Chicago
22 III
Great Western Div—see Interlectric Div El-Tronics
Inc
Green Ball Bearing Co 9518 Cassius Ave Cleveland 5
Ohio Ohio GREEN GUARD—Security Mfg & Contracting Co Greene (R H) Inc 1201 24th St Oakland 7 Calif Greenlee Tool Co 2136 Twelfth St Rockford III Greibach Instruments Corp 315 North Ave New Rochelle NY GRENADIER—Wakefield Lighting Div Grieve-Hendry Co Inc 1350 N Elston Ave Chicago 22 Crippell Co La Colon C Gri nell Co Inc 260 W Exchange St Providence 2 RI GRIP-FLEX—Copperweld Steel Co Wire & Cable Div GRIP-KLIPS—Specialties Inc GrIP-KLIPS—Specialties Inc Grip-Tite Mfg Co 115 W Jefferson St Winterset Grip-Tite Mfg Co 115 W Jefferson St Winterset Iowa
GRIP-TYPE—Thiel Tool & Engineering Co
GRIPEZE—Phelps Dodge Copper Products Corp
GRIPMASTER—Champion DeArment Tool Co
GRIPO—Barrett Varnish Co
GRIPZIN—Star Expansion
GRIZZLY—Kaiser Aluminum & Chemical Sales Inc
GRIZZLY—Valser Aluminum & Chemical Sales Inc
GRIZZLY—Ducel Enterprises Inc
GRO-QUICK—Wrap-On Co
GROUND-MMFR—Sticht (Herman H) Co Inc
GROUNDOMETER—Borden Engineering Div M J Johnson Aircraft Engineering Co
GROUND-ULET—Crouse-Hinds Co
Gruber Bros Inc 125 South First St Brooklyn 11
NY Gruber Bros Inc 125 South First St Brooklyn 11
NY
Gruber Lighting—see Gruber Bros Inc
GRYPHON—Brook Motor Coro
GUARANTEE—Partrick & Wilklins Co
Guaranteed Products Inc.—see Shox-Stok Inc
GUARDIAN—Dura Electric Lamp Co Inc
GUARDIAN—General Cable Corp
Guardian Electric Mfg Co 1550 W Carroll Ave
Chicago 7 III
Guardian Light Co 500 N Bivd Oak Park III
GUARSDMAN—West Instrument Corp
Guggemos (K) Co—see Kenworth Co
GUIDE-LINED—Republic Steel Corp
GUIDE RAV—Everwarm Inc
GUILLOTTHF—Wachs (EH) Co
GUILLOTTHF—Wachs (EH) Co
GUILF STREAM—Signal Electric Div King-Seeley Corp
Guilto Industries Inc Alkalime Battery Div Metuchen
NJ N.J GUSCO—Gustaveson Inc Gustaveson Inc 8600 Chestnut St Kansas City 32 Guth (Edwin F) Co 2615 Washington Blvd St Louis GUTH (Edwin F) CO 2015 Washington Blvd St L
3 Mo
GUTHILITE—Guth (Edwin F) Co
GUY GRIP—Preformed Line Products Co
Guyan Machinery Co Inc Box 150 Logan W Va
GWIIIlam Co 348 Furman St Brooklyn 1
GYMLITF—Steber Div Pyle-National Co
GYRO-LITE—Swivelier Co Inc
GYROL—American-Standard

H

H-8 Instrument Co American & Bristol Sts Phila-delphia 40 Pa H & H—Arrow-Hart & Hegeman Electric Co

H-P—Hatheway & Patterson Co Inc
HABIR BUS—Phelps Dodge Copper Products Corp
HABIRONY—Phelps Dodge Copper Products Corp
HABIRSHAW—Phelps Dodge Copper Products Corp
HAGO Aluminum Products Co P O Box 128 Littlestown Pa rtel (Walter) Co 2840 4th Ave So Minneapolis Mrinn
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY
HAFTSON—Haft & Sons Inc
HAIRPINLINE—Illuminating Engineering Co
Halex Die Casting Co 8640 Bessemer Cleveland 27 Haley Electronics Co 57 William Street New York 5 New York
Haley (R G) & Co Inc 767 Spitzer Bidg Toledo 4
Ohio
Haley (R G) International Corp Inc—see Haley (R G) &
Co Inc
HALIDE—Turner Brass Works
Hall (William) Co Canal Bank Windsor Lecks Co Inc
HALIDE—Turner Brass Works
Hall (William) Co Canal Bank Windsor Locks
Com
HAM-R-TOOL—Fastway Fasteners Inc
Hamilton Caster & Mfg Co 1519 Dixie Highway
Hamilton Gaster & Mfg Co 1519 Dixie Highway
Hamilton Fan & Blower Co 2644 Colerain Ave Cincinnati 14 Ohio
Hamilton Fan & Blower Co 2644 Colerain Ave Cincinnati 14 Ohio
Hammarlund Mfg Co Inc 460 W 34 St NY 1 NY
HAMMER-HEAD—Perfectite Co
HAMMER-HEAD—Perfectite Co
HAMMER-HEAD—Perfectite Co
HAMMER-MORE—Tilden Tool Mfg Co Inc
HAMMETER—Star Expansion
HAMRTWIST—Star Expansion
HAMSWITCH—Mallory (P R) & Co Inc
Han-Kor Inc 9520 Richmond Ave Cleveland 5 Ohio
HAND-I-PHONE—Murdock Corp
HANDI-HONE—Murdock Corp
HANDI-HONE—Midrock Corp
HANDI-HALKIE—Motorola Communications & Electronics Inc HANDI-TALICE—Microrola Communications & Electronics Inc
HANDI-TALICE—Microrola Communications & Electronics Inc
Handling Devices Co Inc 34 Concord Lane Cambridge 38 Mass
Handy Angle Div Lug-All Co 355 Lancaster Ave
Haverford Pa
HANDY CRAFT—Westinghouse Electric Corp
HANG-RITE—U S Expansion Bolt Co
HANG-RITE—U S Expansion Bolt Co
HANK'S—Klein (Mathias) & Sons
Hankscraft Co Control Div—See Acro Switch Div
Robertshaw-Fulton Controls Co
Hanovia Lamp Div Engelhard Industries Inc 100
Chestnut St Newark 5 NJ
Hansen Mfg Co Inc RR ±1 Princeton Ind
HAP-E-LITE—Alkco Mfg Co
HAPCO—Hubbard & Co
HAPCO—Hubbard & Co
HARBOT—Unimatic Corp
HARBOT—Unimatic Corp
HARBOT—Unimatic Corp
HARBOT—Unimatic Corp
HARG Control Contro Harder Calif Call Hardman (H V) Co Inc Prayaman (H V) Co Inc HARDSET—Hardman (H V) Co Inc HARDY TOOLS—Interstate Drop Forge Co Special Products Div Harnischfeger Corp 4400 W National Ave Milwaukee 46 WIs Co 210 E Alder St Walla Walla Wash arper Electric Furnace Corp 39 River St Buffalo 2 NY Harper Electric Furnace Corp 39 River St Burnalo 2
NY
Hart & Hegeman—see Arrow-Hart & Hegeman Electric Co
HART-LOCK—Arrow-Hart & Hegeman Electric Co
HART-LOCK—Arrow-Hart & Hegeman Electric Co
Hart Mig Co 164 Bartholomew Ave Hartford Conn
Hartford Blower Co—see Sterling Blower Co
Hartzell Propeller Fan Co
HARVEL—Hartzell Propeller Fan Co
HARVEL—Hartzell Propeller Fan Co
HARVEL—Hartzell Propeller Fan Co
HARVEL—Hartzell Propeller Fan Co
HASCO—National Band & Tag Co
Hasco Electric Corp 30 Grove Ave New Rochelle NY
Hastings Air Conditioning Co Inc 108 S Colorado Ave
Hastings Neb
HATCORONE—Hatfield Wire & Cable Div Continental
Cooper & Steel Industries Inc
HATEMP—Hatfield Wire & Cable Div Continental
Cooper & Steel Industries Inc
Hatfield Wire & Cable Div Continental
Cooper & Steel Industries Inc
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HATELEX—Hatfield Wire & Cable Div Continental
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HATSEAL—Hatfield Wire & Cable Div Continental
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Cooper & Steel Industries Inc
HATYINOL—Hatfield Wire & Cable Div Continental
Cooper & Steel Industries Inc
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Cooper & Steel Industries Inc
HATYINOL—Hatfield Wire & Ca Hart & Hegeman-see Arrow-Hart & Hegeman Electric Lithograph Co
HAZARDSTRIPE—Westline Products Div Western

HEAT-A-LITE—Nutone Inc
HEAT KILLERS—Coppus Enginering Corp
Heat-Timer Corp 657 Broadway New York 12 NY
HEATAIRE—Market Electric Products Inc
HEATMOBLE—Siebring Mfg Co
Heatmore Inc 651 Driggs Ave Brooklyn 11 NY
HEATSUM—Roberson Inc
HEATUBE—see McGraw-Edison Co Albion Div
HEATUBE—see McGraw-Edison Co Albion Div
HEATUBE—see McGraw-Edison Co Albion Div
HEET-X—Hatfield Wire & Cable Div Continental Copper & Steel Industries Inc.
Hein-Werner Corp 1200 National Ave Waukesha Wis
Heinemann Electric Co Pennsylvania Ave & Plum St
Trenton 2 NJ
Heinze Electric Co 685 Lawrence St Lowell Mass
HELECON—United States Radium Corp
Heller Bros Co—see Heller Tool Co
Heller Industrial Fastener Div Heller Roberts
Corp 6115 Carnegie Ave Cleveland 1 Ohio
Heller Tool Co Heller Drive Newcomerstown Ohio
Helwig Co—see Heller Garbon Products Inc
Helwig Carbon Products Inc
Helwig Garbon Products Inc
Helwig Garbon Products Inc
Helwig Mfg Co—see Interstate Drop Forge Co Helwig Carbon Products Inc 2550 N 30 St Milwawkee 10 Wis Helwig Mfg Co—see Interstate Drop Forge Co HEMINGRAY—Kimble Glass Co HEMISPHERE—Penetray Corp Henderson Electric Co 25 Greenwood Ave East Orange NJ Henderson-Hazel Corp 13601 Euclid Ave Cleveland 12 Ohio Henderson-Hazel Corp 13601 Euclid Ave Cleveland 12 Ohio
Hendrix Wire & Cable Corp Milford NH
HERCULES—Duro-Test Corp
HERCULES—Duro-Test Corp
HERCULES—Whitman & Barnes Div United Drill & Tool Cory
HERCULES—Linemaster Switch Corp
HESS BRIGHT—SKF Industries Inc
Hesse Products Co 3200 N Virginia St. Reno Nev
Hesse (W A) & Co—see Hesse Products Co
Hessel (W F) Co Inc 74 Beekman St. NY 38 NY
Hetherington Inc—see Controls Co of America Control
Switch Div
Hewitch Robins 666 Genbrook Rd Stamford Conn
Hewson (John) Co—see Hewson Co Inc
Hewson Co Inc 115 Maple St. Summit NJ
HEX-A-LUME—Solux Corp
Hexacon Electric Co 161 W Clay Ave Roselle Park
NJ
HEXCAST—IJ S Expansion Bolt Co Hewson Go Inc 115 Maple St Summit NJ
HEX-A-LUME—Solux Corp
Hexacon Electric Co 161 W Clay Ave Roselle Park
NJ
HEXCAST—U S Expansion Bolt Co
Hexcel Products Inc 2332 4th St Berkeley 10 Calif
HEXCLAD—Hexacon Electric Co
HEXSEAL—APM Corp
HEXTHODE—Luxor Lighting Products Inc
HEYCO—Heyman Mfg Co
Heyman Mfg Co
HI—Hould Industries Inc
HI—AMP—Lenco Inc
HI—BREAK—General Electric Co
Apparatus Sales
HI—CORE—Alpha Metals Inc
HI—FI—Event Lighting Corp
HI—FLUX—Annis (R B) Co
HI—HEAT—Radiant Lamp Corp
HI—HOIST—Letteraft Mfg Co Inc
HI—LO—Stater Electric & Mfg Co Inc
HI—LO—Metalcraft Products Co Inc
HI—LO—Hetalcraft Products Co Inc
HI—LO—FLEX—AOW Corp
HI—MEG—Oolph (John C) Co
HI—UNITPUT—Westinghouse Electric Corp
HI—RAD—Boolph (John C) Co
HI—RED—Holbu Industries Inc
HI—REACH—Economy Engineering Co
HI—RED—Holbu Industries Inc
HI—SPECI—Bockson Corp
HI—SPECI—Bockson Corp
HI—SPECI—Bockson Corp
HI—SPECIT—Radiant Lamp Corp
HI—SPECIT—Radiant Lamp Corp
HI—SPECIT—Radiant Lamp Corp
HI—TREADLITE—Linemaster Switch Corp
HI—TREADLITE—Linemaster Switch Corp
HI—TREADLITE—Linemaster Switch Corp
HI—TRENIC—Biss Electronic Corp
HI HIGH SPEED-Capewell Mfg Co Highway Trailer Co 405 E Fulton St Edgerton Wis Hill (Walter P) Inc 22183 Telegraph Rd Detroit 19 Mich Hill Transformer Co—see Delta-Star Flectric Div H K Porter Co Inc n R Porter Co Inc
Hillsdale Commutator Co—see Toledo Cc Lattor Co
Hilto—Driver (Wilbur B) Co
Hilti Inc 73 Southfield Ave Stamford Conm
Hilti Rapid Fastening Systems—see Hilti Inc
Hindle Transformer Co Inc Woods Church Rd Flemington NJ ington NJ HINJON—Thomas & Betts Co HIPOT—Peschel Electronics Inc HIPPO—Mueller Electric Co

Healy-Ruff Co Water Level Controls Div 2255 University Ave St Paul 14 Minn

Lithograph Co HEADERDUCT—Walker Brothers

Hirschman-Pohle Co Inc. 300 Lent. Ave. Le Roy. NY
Hitemp Wires Co. 1200 Shames Dr. Westbury. NY
HIWRAP—Hitemp Wires Co.
HO—Phelps Dodge Copper Products. Corp.
Hoboart. Bros. Hobart. Story. 1. Ohio.
Hoffman Engineering. Corp. 1050. Tyler St. Anoka.
Minn. Minn
HOIST-ALL—Coffing Hoist Div Duff-Norton Co
HOL-DEM—Electric Service Systems Inc
Holan Corp 4100 W 150 St Cleveland 35 Ohio
Holcor Metal Fabricating & Finishing Corp—see House-Molan Corp. 4100 W 150 St. Creveland 35 Unio
Molaro Metal Fabrication & Finishing Corp—see HouseO-Lite Corp
Hold-Dem Electric Fencer Co—see Electric Service
Systems Inc
MOLD-IT—Arro Expansion Bolt Co
HOLD-IT—Madison Equipment Co
HOLD-IT—Madison Equipment Co
HOLD-IT—Hoffman Engineering Corp
HOLD-FATS—Ludlow Mfg & Sales Co
HOLDTITE—Horited States Rubber Co
HOLDFATS—Ludlow Mfg & Sales Co
HOLDTITE—United States Rubber Co
HOLE-SHOOTER—Milwaukee Electric Tool Corp
HOLGUN—Black & Decker Mfg Co
HOLDAY—Day-Brite Lighting Inc
Hollands Mfg Co—see Erie Tool Works
Hollingsworth Lohn R)—see Hollingsworth Co
Hollingsworth Cohn See Hollingsworth Cohn
Hollingsworth Cohn Compension of the Compension of Holophane Co Inc 342 Madison Ave New York 17 NY
Holtzer-Cabot Div National Pneumatic Co Inc 125
Amory St Boston 19 Mass
Holtzer-Cabot Electric Co—see Holtzer-Cabot Div
National Pneumatic Co Inc
Holub Industries Inc 442 Elm St Sycamore III
HOLZIN—Star Expansion
HOM.-A-LARM—Castle Engineering Co
Homelite Corp—see Homelite Div Textron Inc
Homelite Div Textron Inc 67 Riverdale Ave Port
Chester NY
Homer Commutator—see Toledo Commutator Co
HOMOFLER—Raybestos-Manhattan Inc
HONEY-GLO—Hexcel Products Inc
HONEY-LITE—Hexel Products Inc
HONEY-LITE—Hexel Products Inc
HONEY-LITE—Hexel Products Inc
HONEY-LITE—Hexel Products Co Inc
Hopa Electric Inc 547 Greenwich St NY 13 NY
Hope Electrical Products Co Inc 27 Leng Ave Hillside NJ
HORIZON—Benjamin Div (Thomas Industries Inc)
HORSE-HEAD—New Jersey Zinc Co
Hoss-McCann Telephone Co Inc
Loss-McCann Telephone Co In Inst.

Hose-McCann Corp—see Hose-McCann Telephone Co
Inst.

Hose-McCann Telephone Co Inc. 25th St & 3rd Ave
Brooklyn 32 NY

HOSPITAL-LITE—Swiveller Co Inc.
HOTROD—Pyrosil Inc.
HOTROD—Pyrosil Inc.
HOTROD—Pyrosil Inc.
HOTROD—Pyrosil Inc.
HOTROD—Pyrosil Inc.
HOTROD—Pyrosil Inc.
HOWARDLE Co 5600 W Taylor St Chicago 44 III
HOTTAP—Burndy Corp
HOWAFOLLE-DOR—Howell Mfg Co
HOWARD LICE Corp. 2430 S Ashland Ave Chicago 8 III
HOWAFOLLE-DOR—Howell Mfg Co
HOWARDLECT-IC Co 1950 Ruby St Melrose Park III
HOWARD LICETTIC CO 1950 Ruby St Racine Wis
HOWARDLE—Howard Electric Co
HOWARDLE—Howard Electric Co
HOWARDLE—HOWARDLE—HOWELL
HOWARDLE—HOWELL
HOWELL
HOWELL INSTRUMENT Co—see Howell Instruments Inc.

Nowell Electric Motors Co 409 N Roosevelt Howell Mich Mich Howell Instrument Co—see Howell Instruments Inc Howell Instruments Inc 3479 W Vickery Blvd Fort Worth 7 Tex Howell Mistor Co 1 N Morehall Rd Paoli Pa HOWE'S—Klein (Mathias) & Sons Hoyt Electrical Instrument Works 42 Carleton St Cambridge 42 Mass Hoyt Mig Corp Forge Rd Westport Mass Hoyt Mig Corp Forge Rd Westport Mass Hoyt Southern Corp—see Hoyt Mig Corp Hub Electric Co 2255 W Grand Ave Chicago 12 III HUB MOUNT—Hubbard & Co Hubbard & Co 6301 Butler St Pittsburgh 1 Pa Hubbard Spool Co—See American Pulley Co Hubbard & Co 6301 Butler St Pittsburgh 1 Pa Hubbard Spool Co—See American Pulley Co Hubbell (Harvey) Inc State St & Bostwick Ave Bridgeport 2 Conn HUBBELOCK—Hubbard & Co HUBRAK—Hubbard & Co Hubrason Lamp Co 528 Elm St Kearny NJ Hudson Lamp Co 528 Elm St Kearny NJ Hudson Lamp Co 528 Elm St Kearny NJ Hughes Bross Inc Sevand Neb Hughey & Phillips Inc 3200 N San Fernando Blvd Burbank Calif Hullhorst Micro Tool Co—see Hullhorst Tools Inc Let Humilbort Tools Inc 227 Wamba Ave (P 0 Box 3344) Toledo 7 Ohio Humilbo-HTMTER—Walton Laboratories Inc HUMIDOLAN—Star Porcelain Co HUMIDOLAN—Star Porcelain Co HUMIDOLAN—Star Porcelain Co

HUMIDO-I-METER—Walton Laboratories Inc
HUMIDOLAN—Star Porcelain Co
HUMIDOMIST—Supreme Electric Products Co
HUMP DRIVE—Thiel Tool & Engineering Co
HUNTER—Ray-O-Vac Co
HUNTER—Waveland Electric Co
HUNTER—Waveland Electric Co
HUNTER—Waveland Electric Tools
Hunter Div Robbins & Myers Inc 2500 Frisco Ave
Memphis 14 Tenn
Hunter Fan & Ventilating Co—see Hunter Div Robbins
& Myers Inc
Hunter (R N) Sales Co—see Hunter Tools
Hunter Tools 9851 Alburtis St Santa Fe Springs
Calif

HUNTSMAN-Kedman Co

Huntsman Welding Shield Co—see Kedman Co Huppert (K H) Co 6830 S Cottage Grove Ave Chi-cago 37 III

HUSH-A-MATIC—Hays Mfg Co HUSKY—Price Electric Corp Husky Products Inc 5300 Vine St Cincinnati 17 Ohio Nusky Products Inc. 5300 Vine St. Cincinnati Ar.
Ohio
Hussey (CG) & Co. 2850 Second Ave.
Pittsburgh 19
Pa.
HY-A-SIL.—Sanford Miller Co. Inc.
HY-CAP—Illinois Condenser Co.
HY-ELECTRIC—Kritzer Products Div.
HY-LITER—Guth (Edwin F) Co.
HY-LITER—Guth (Edwin F) Co.
HY-LITER—Guth (Edwin F) Co.
HY-LOAD—Hyatt Bearings Div. General Motors Corp.
HY-RE-FLEC—Globe Lighting Products Inc.
HY-SOL.—Charleston Rubber Co.
HY-TIN—Farrelloy Co.
HY-TIN—Farrelloy Co.
HY-TIN—Farrelloy Co.
HY-TIN—Farrelloy Co.
HY-W-DEOthezat Fans. Div.
Hydrat Bearings Div. General Motors Corp.
HYB-BATL—Burndy Corp.
HYDRACTE—Premax Products Div.
HYDRACTE—Premax Products Div.
HYDRACTE—Hatfield Wire & Cable Div.
HYDRACTE—Hatfield Wire & Cable Div.
HYDRACTE—Hatfield Wire & Cable Div.
HYDRACTE—Addited Wire & Cable Div.
HYLINK—Burndy Corp.
HYPRO—Markel (I. Frank) & Sons.
Hydron Minnesota Mining & Mig Co.
HYPRESS—Burndy Corp.
HYPRO—Markel (I. Frank) & Sons.
Hydron Minnesota Mining & Mig Co.
HYPRESS—Burndy Corp.
HYPRESS—Burndy Corp.
HYPRO—Hypro Engineering Inc.
Hypro Engineering I sey (CG) & Co 2850 Second Ave Pittsburgh 19

1

I-EZE—Artistic Lamp Mfg Co Inc
I-LINE—Allen Cooler & Ventilator Inc
I A C—Industrial Automation Corp
IBM—International Business Machines Corp
IC—Interlectric Div El-Tronics Inc
IDI—International Delectric Fence Co Inc
IEFCO—International Delectric Fence Co Inc
IEFC—Inionis Edison Porcelain
IMC—Insulation Mfrs Corp
IMC Magnetics Corp 570 Main St Westbury NY
IMP—Pyramid Electric Co
IPF—Industrial Plastic Fabricators Inc
I-F-E Circuit Breaker Co 1900 Hamilton St PhiladelI-F-E Circuit Breaker Co BuilDog Electric Products
Div 7610 Jos Campau Detroit Mich
I-T-E Circuit Breaker Co Greensburg Div P 0 Box 98
Greensburg Pa
I-T-E Circuit Breaker Co Victor Insulators Div Victor
NY

NY
I-T-E Circuit Breaker Co Walker Div PO Box 2384
Station D Atlanta Ga
ITT Components Div P O Box 412 Clifton NJ
IXL—Collyer Insulated Wire Co
Ideal Commutator Dreser Co—see Ideal Industries Inc
Ideal Electric and Mfg Co East First St Mansfield Ideal Industries Inc 5136 Park Ave Sycamore III
IDEALARC—Lincoln Electric Co
Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 III
I.G.Dilla 180 V.

Ilg Electric Ventilating Co 2850 N Pulaski Rd Chicago 41 III
ILG-DUALAIR—Ilg Electric Ventilating Co
ILGETTE—Ilg Electric Ventilating Co
ILGETTE—Ilg Electric Ventilating Co
ILGUENT—Ilg Electric Ventilating Co
ILGUENT—Ilg Electric Ventilating Co
ILGUENT—CAP—Illinois Condenser Co
Illinois Condenser Co Illinois Edison Porcelain McGraw-Edison Co 510 N Pearl St Macomb III Illinois Electric Porcelain Co—see Illinois Edison Porce-

Illinois Malleable Iron Co—see Appleton Electric Co Illinois Testing Laboratories Inc 420 N LaSalle St Chicago 10 III Illumitronic Engineering Corp 680 E Taylor Ave Sunnyvale Calif

Ilsco Corp 4730 Madison Rd Cincinnati 27 Ohio Ilsco Copper Tube & Products Inc—see Ilsco Corp IMCOR—Insulation Mfrs Corp IMMERSATHERM—Mercoid Corp IMPACTOOL—Ingersoll-Rand Co IMPERIAL—Miller Co

Imperial Electric Co 84 Ira Ave Akron 9 Ohio Imperial Lighting Products Co—see Emerson Imperial Lighting Co IMPERIALITE—Emerson-Imperial Lighting Co IMPERVEX—Crescent Insulated Wire & Cable Co IMPERVOL—Crescent Insulated Wire & Cable Co IMPROV-A-LITE—General Electric Co IMPROV-A-LITE—Index-Belt Co Inc IMPROV-A-LITE—Index-Belt Co Imperial Electric Co Imperial Electric Co Imperial Electric Co Imperial Engineering & Equipment Co Imperial Engineering & Equipment Co Imperial Electric Co—see Independent Products Co—see Independent Protection

Independent Pneumatic Tool Co—see Thor Power Tool Co
Co
Independent Products Co—see Independent Protection
Co Inc
Independent Protection Co Inc
Independent Protection Co Inc
Independent Protection Co Inc
Independent Protection Co Inc
Induction Induction Heating Corp 181 Wythe Awe Brooklyn
11 NY
Induction Motors Corp—see IMC Magnetics Corp
INDUCTOR—American-Standard
INDUCTROL—General Electric Co
INDUSTRIAL AIR—Bertram (Harvey P) Co
Industrial Automation Corp 2415 W Montrose Ave
Chicago III
Industrial Control Panel Co—see Control Panel Corp
Industrial Control Panel Co—see Control Panel Corp
Industrial Control Panel Co—see McGraw-Edison Co
Albion Div
Industrial Electric & Mfg Co—see McGraw-Edison Co
Albion Div
Industrial Electric Switches of Indiana Box 218 New
Augusta Ind

Industrial Electric Switches of Indiana Box 218 New Augusta Ind Industrial Electrical Works Inc 1509 Chicago St Omaha 2 Neb Industrial Engineering & Equipment Co Inc 24 Hanley Industrial Engineering & Equipment Co Inc 24 Hanley Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY Industrial Instrument Co—see Seely Instrument Co Inc Industrial Instruments Inc 89 Commerce Rd Cedar Grove NJ Industrial Lamp Corp 14th & Blaine Sts Elkhart Ind

Industrial Plastic Fabricators Inc Endicott St Norwood Mass
Industrial Plastic Fittings Co 3891 W 150 St Cleveland 11 Ohio
Industrial Transformer Corp Gouldsboro Pa
INDUSTRIALIST—Duro-Test Corp
Industriline Inc—see Cam-Lok Div Empire Products
Line

Inland Ladder Go 1914 Stamord St Alameda
Calif
INMANCO—Insulation Mfrs Corp
INNER-SPRINGS—Urell Inc
INSA-LITE—Sauereisen Cements Co
INSANOL—Westinghouse Electric Co
INSECTO—Solar Electric Corp
INSOLUSEAL—Anaconda Wire & Cable Co
INST-O-VERSE—Franklin Electric Co Inc
INST-O-VERSE—Franklin Electric Co Inc
INST-A-START—France Mfg Co
INST-ANT GALL—Radio Corp of America
INSTANT HEAT—Emerson-Pryne Co
INSTANT HEAT—Emerson-Pryne Co
INSTANT HEAT—Emerson-Pryne Co
INSTANT HEAT—Corp
INSTEPAC—Onan Div Studebaker-Parkard Corp
Insto-Gas Corp 998 E Woodbridge St Detroit 7
Mich INSTROF—Cope (TJ) DIV Rome Cable Corp Instrument Laboratories 315 W Walton PI Chicago 10

III
InsuI-8-Corp 1369 Industrial Rd San Carlos Calif
INSUL-LOCK—Anthony (F M) Co
INSUL-PIN—Graham Mfg Co
INSULA—Quigley Co Inc
InsuIation Mfrs Corp 565 W Washington Bivd Chicago 6 III
INSULINER—Thomas & Betts Co
INSULINER—Burndy Corp
INSULINER—Hubbell (Harvey) Inc
INSULSEAL—Eagle-Picher Co
INSULINER—Burndy Corp

INSULUG—Burndy Corp INTAIRE—Westinghouse Electric Corp INTAIRE—Westinghouse Electric Corp Integrated Ceilings & Grilleworks Inc Blvd Los Angeles 64 Calif INTENSO—Appleton Electric Co INTER-LINK—Cable Electric Products Inc INTER-LINK—Leviton Mfg Co Inc INTER-ENCE FREE—Cold Cathode Lighting Corp

Interlectric Corp—see Interlectric Div El-Tronics Inc Interlectric Div El-Tronics Inc 1401 Lexington Ave Warren Pa INTERLOCK—Hubbell (Harvey) Inc INTERNATIC—International Register Co International Business Machines Corp Times Equip-ment Div 590 Madison Ave New York 22 NY International Crossarm Co Inc—see Haley (R G) & Co Inc

International Electric Fence Co Inc Box 650 Albert International Electric Industries Inc-see Beckley ElecInternational Fermont Machinery Co Inc Ramapo
NY
International Lighting Mfg Co 1825 N 19 St St
Louis 6 Mo
International Metal Hose Co Ashford Ave Believue
Ohio
International Metal Hose Co Ashford Ave Believue
Ohio
International Metal Hose Co Ashford Ave Believue
Ohio
International Metal Hose Co Ashford Ave St
International Metal Hose Co 3800 Park Ave St
Mo International Register Co 2620 W Washington Blvd
Chicago 12 III
International Seal & Knot Protector Co 58-02 37th
Ave Woodside 77 NY
Ave Woodside 77 NY
Ave Woodside 77 NY
International Telephone & Telegraph Corp Industrial
Products Div 15191 Bledsos St San Fernando Calif
International Trailer Co Inc 725 North Point Rd
Baltimore 6 Md
Internate Drop Forge Co Special Products Div
4051 N 27 St Milwaukee 16 Wiss
Interstate Rubber Products Corp 908 Avila St Los
Angeles 12 Calif
International Trailer Co Inc 725 North Point
INTRA-TEL—General Electric Co
INVERTOLITE—Adjustable Fixture Co
Invincible Vacuum Cleaner Mfg Co Dover Ohio
INVISSA LINE—Arvin Industries Inc
INVISSA LINE—Arvin Industries Inc
INVISSA ER RAY—American District Telegraph Co
Iona Ventilater Co Inc 2821-29 W Dauphin St
Phila 32 Pa
IONAIRE—Wesix Electric Heater Co
IONOSTAT—United States Radium Corp
IONOSTAT—United States Radium Corp
IONOSTAT—United States Radium Corp
IONOSTAT—Builed States Radium Corp
IONOSTAT—Suide Industrial Div
IRNATHENE—General Electric So
Irvington Varnish & Insulator Co —see Minnesota Mining & Mfg Co Irvington Div
IRNATHENE—General Control Co
Ionantie Mfg Corp
ISO ELAS—Natvar Corp
ISO GLAS—Natvar Corp
ISO GLAS—Natvar Corp
ISO GLAS—Natvar Corp
ISO FORCE—General Control Co
Ionantie Mfg Corp Stirling NJ
ISOLASTANE—Natvar Corp
ISOLATE—Wesix Estex Radium Corp
IVXNHOE—Miller Co
IVCO—Iona Ventilator Co Inc
IVI-SPRAY—Minnesota Mining & Mfg Co Irvington
IVVON-Lound Ventilator Co Inc
IVI-SPRAY—Minnesota Mining & Mfg Co Irvington
IVVON-Lound Ventilator Co Inc
IVI-SPRAY—Minnesota Mining & Mfg Co Irvington
IVVON-Lound Ventilator Co Inc
IVI-SPRAY—Minnesota Mining & Mfg Co Irvington
IVVON-Lou

J

J-LINE—Lint (Clyde W)
Jack & Heintz Div Siegler Corp P 0 Box 6719
Cleveland 1 Ohio
Jack & Heintz Div Siegler Corp P 0 Box 6719
Cleveland 1 Ohio
Jack & Heintz Inc—see Jack & Heintz Div Siegler
Corp
JACK STACKER—Lewis-Shepard Products Inc
JACKLIFT—Lewis-Shepard Products Inc
JACKLIFT—Lewis-Shepard Products Inc
JACKSON—Vulcan Electric Co
Jackson Electrical Co 900 W van Buren St Chicago 7 III
Jackson Electrical Instrument Co 124 McDonough St
Dayton 2 Ohio
JACABI—Biddle (James G) Co
JACABI—Biddle (James G) Co
JACABI—Biddle (James G) Co
Janette Electric Mfg Co LeHigh at Main Sts Morton
Growe III
JAQUET—Sticht (Herman H) Co Inc
Javex—see Javex Electronics
Javex Electronics P O Box 646 Redlands Califf
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn
38 NY
JAYCANDESCENT—Jay Lighting Mfg Co Inc
JEEP—Mercury Mfg Co
Jefferson Electric Co 25th & Madison Bellwood III
Jeffrey Mfg Co 832 N 4 St Columbus 16 Ohio
Jeffries Transformer Co 610 Turner St Los Angeles
12 Calif
Jensen Inc 9331 Freeland Ave Detroit 28 Mich
Jensen Specialties Inc—see Jensen Inc
Jerroid Electronics Corp Jerroid Bidg 15th & Lehigh
Ave Philadelphia 32 Pa
JET FLUX—All-State Welding Alloys Co Inc
Jet Line Gun Co Inc—see Jet Line Products Inc
Jet Line Products Inc 615 Fugate Ave Charlotte
NC
JET-STREAM—Signal Electric Div King-Seeley Corp
Jeta Inc Yonkers NY
Jeta Metal Fabricators Inc—see Jeta Inc
JETALECTRIC—jeta Inc
JETALECTRIC—jeta Inc
JETALECTRIC—jeta Inc
JETALECTRIC—Jeta Inc
JETALECTRIC—Jeta Inc
JETALECTRIC—Jeta Inc
JETSTREAM—Kent Co
JIFFY—Eagle Electric Mfg Co Inc
JIFFY—Eagle Electric Mfg Co Inc
JIFFY—Ragle Electric Mfg Co Inc
JIFFY—Mineraliac Electric Co
JIFFY ON—Atlas Metal Industries
Jo-CLAMP—Jordan Industries Inc

JO-STRAP—Jordan Industries Inc
JOB-SITE—International Trailer Co Inc
JOBMASTER—Ramset Fastening System
Johns-Manville 22 E 40 St. New York 16 NY
Johnson Bronze Co 500 S Mill St. New Castle Pa
Johnson Mfg Co Inc 600 Anamosa Rd Mt Vernon
Iowa
Johnston Foil Mfg Co 6106 S Broadway St Louis
11 Mo
JOINTED-ARM—Woodward Machine Co
Joleco Corp 2513 Baldwin St St Louis 6 Mo
JOMARCO—Johns-Manville
Jones Motrola Corp 432 Fairfield Ave Stamford
Conn
Jordan Electric Products Electric Storage Battery Co
P 0 Box 6266 Cleveland 1 Ohio
Jordan Electrical Mfg Co Inc—see Jordan Electrical Mfg Co Inc
Jordan Electronic Mfg Co Inc—see Jordan Electronic SJ
Jordan Figer ST
Jordan Electronic Mfg Co Inc—see Jordan Electronic SJ
Jordan Figer ST
Jordan Electronic Mfg Co Inc—see Jordan Electronic SJ
Jordan Electronic Mfg Co

K

K-B Lighting Mfg Co 2101 Byberry Rd Phila 16
Pa
K & B—Kirk & Blum Mfg Co
K & H—Krueger & Hudepohl Inc
K-LITE—Kalsan Electric Co Inc
K & M—Keasbey & Mattison Co
K-R—Kruse-Rieke
K-RAY-M—Condi-Lite Corp
K-S-V—Arex Co
K/W—Kaiser Aluminum & Chemical Sales Inc
KA-LUG—Burndy Corp
Kaiser Aluminum & Chemical Sales Inc
KA-LUG—Burndy Corp
Kaiser Aluminum & Chemical Sales Inc
Kalser Electric Co Inc
Sales Inc
Kalb Fell Laboratories Inc—see Kin Tel Div Cohu
Electronics Inc
Kalson Electric Co Inc 146 Mott St Oceanside NY
KAM-LOK—Kelek Co
KANGO—Porter-Cable Machine Co
KANTARK—McCaffrey Mfg & Supply Co
KANTARK—McCaffrey Mfg & Supply Co
KARAK—Ohio Carbon Co
CARBATE—National Carbon Co
KARRI-Go—Silent Hoist & Crane Co
KATHANODE—Gould-National Batteries Inc
Kato Engineering Co 1442 First Ave
Mankato
Minn
Katolight Corp First Ave McCaphilan
Katolight Corp First Ave Minn
S91) Mankato Minn K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Kato Engineering Co 1442 First Ave Mankata Minn
Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn
Kauffman Air Conditioning Co 4336 W Pine Blvd St Louis Mo
Kawner Co Niles Mich
KAY-BEE—K-B Lighting Mfg Co
Kay Electric Co Maple Ave Pine Brook NJ
Kay Lab—see Kin Tel Div Cohu Electronics Inc
Kayline Co 1241 E 45 St Cleveland 14 Ohio
KAYMOR—Scranton Storage Battery Corp
KEARNALEX—Kearney (James R) Corp
KEARNALEX—Kearney (James R) Corp
Kearney (James R) Corp
Kearney (James R) Corp
Kearney (Lames R) Corp
Kearney (L Kedman Co 233 S Fifth West St Salt Lake City Utah
KEELITE—McKee Dlv
KEEN ARC.—Becker Bros Carbon Co
KEEN ARC.—Becker Bros Carbon Co
KEEN CUT—Becker Bros Carbon Co
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb
Keil (Francis) & Sons Inc—see Trine Mfg Corp
KELCO—Kneisley Electric Co
Kelic Co 59 Davis Ave Norwood
Keliems Co Inc 15 Williams St Stonington Conn
Kelims Products Co—see Kellems Co Inc
Kelig Specialty Co 5958-60 Washington Blvd Chicago 44 III
KEN-AIRE—Argo Products Co
Kenbert-Aprag Co 220 Coster St Bronx 59 NY
Kendall Co—see Polyken Sales Dlv
Kennecott Wire & Cable Dlv Okonite Co Phillipsdaie Rumford 16 RI
Kent Co Inc 359 Canal St Rome NY
Kent Lighting Corp 500 Johnson Ave Brooklyn 37
NY
Kent Metal Mfg Co Inc—see Kent Lighting Corp NY
Kent Metal Mfg Co Inc—see Kent Lighting Corp
KENTEX—Kent Lighting Corp
KENTLITE—Kent Lighting Corp
Kerrigan Iron Works Co 1033 Herman St Nashriile 2 Tenn
Kester Solder Co 4201 Wrightwood Ave Chicago 39 Illinois Kett Appliance Co—see Kett Tool Co

Kett Tool Co 5055 Madison Rd Cincinnati 27 Ohio
Key-Hak Corp—see Producers & Distributors Inc
Key-Hak Products Co—see Producers & Distributors
Inc
Key-Solavis Co 89 14th St Battle Creek Mich
KEYNOTE—Edwards Co Inc
KEYSTONE—Diamond Expansion Bolt Co Inc
KEYSTONE—Diamond Expansion Bolt Co Inc
KEYSTONE—Fullman Mfg Co
Keystone Carbon Co Inc 1935 State St St Marys
Page 1 Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa Keystone Mfg Co 23328 Sherwood Rd Warren Michigan Kichler (L D) Co 2101 Superior Ave Cleveland 14 Kichler (L D) CO 2103 Superior Condition (Alarms Div Walter Kidde Ultrasonic & Detection Alarms Div Walter Kidde Ultrasonic & Detection Alarms Inc—see Kidde Ultrasonic & Detection Alarms Div Kilbury Mfg Co Inc 14529 Hawthorne Blvd Lawndale Calif Killark Electric Mfg Co 3940 Easton Ave St Louis 13 Mo KIIIark Electric ming CO 3740 Earland
13 Mo
KILOTRON—Electric Arc Inc
Kimble Glass Co P O Box 1035 Toledo 1 Ohio
Kin Tel Div Cohu Electronics Inc 5725 Kearney
Villa Rd San Diego 12 Calif
KINAMATIC—General Electric Co Apparatus Sales KINATROL—General Electric Co Apparatus Sales DIV Kindorf Co—see Steel City Electric Co KING—Code Corp KING—Partrick & Wilkins Co KING LITE—Rab Electric Mfg Co Inc King Mfg Corp 3146 N Chicago Ave Chicago 22 KING LITE—Rab Electric Mfg Co Inc
King Mfg Corp 3146 N Chicago Ave Chicago 22
King Refrigerator Corp 76-02 Woodhaven Blvd Glendale 27 NY
Kingston Conley Inc Plainfield NJ
Kinnery Electrical Mfg Co 678 Buckeye St Elgin
III
Kirel Inc CPD Box 387 Kingston NY
Kirk & Blum Mfg Co 3120 Forrer St Cincinnati
9 Ohio
KIRK-KEY—I-T-E Circuit Breaker Co
Kirkland (H R) Co 8 King St Morristown NJ
Kirkwood Carbon Corp 4857 W 130 St Cleveland
35 Ohio
Kirkwood Carbon Corp 4855 W 130 St Cleveland
35 Ohio
Kirkwood Carbon Corp 4855 W 130 St Cleveland
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11 Ohio
Kirkwood Corp 13 Ohio
Kirkwood Corp 4855 W 130 St Cleveland
11 Ohio
Kirkwood Carbon Corp 13 Ohio
Kirkwood Corp 13 King 111 Mó
Kneisley Electric Co 2501-2509 Lagrange St Toledo 3 Ohio
KNI-TRON—Kneisley Electric Co
KNOPD Inc 1307 66th St Oakland 8 Calif
Knox Porcelain Corp 2706 Mynders Ave (P 0 Box
2031) Knoxville 1 Tenn
Koch (Paul W) & Co—see Lint Clyde W)
Koch & Lowy Inc 201 E 34 St New York 16 NY
KODAIRE—Sperti Faraday Inc
Koehler Mfg Co 395 Lincoln St Marlboro Mass
Kohler Co Kohler Wis
Koiled Kords Inc Box K Hamden Conn
KOLDBOND—Columbia Electric & Mfg Co
KOLOR KODOED—Guth (Edwin F) Co
KOLOR KODLE—Tilden Tool Mfg Co Inc
KOOL-KOLL—Advance Transformer Co
KOOLE—State—United States Air Conditioning Corp
KOOLEPAK—Sprague Electric Co
Kopex Div Gemmer Mfg Co 6400 Mt Elliott Ave
Detroit Mich
Koppers Co Inc Wood Preserving Div 750 Koppers
Bldg Pittsburgh 19 Pa
Kord (Leonard E) Co 2751 N Emerson Ave Indianapolis 18 Indi Kneisley Electric Co 2501-2509 Lagrange St To-Bldg Pittsburgh 19 Pa
Kord (Leonard E) Co 2751 N Emerson Ave Indianapolis 18 Ind
Kord Mfg Co Inc 4510 White Plains Rd New
York 70 NY
KORDUCT—Johns-Manville
KORKER—U S Expansion Bolt Co
Korns (C C) Co P 0 Box 483 Johnstown Pa
Kortick Mfg Co 5600 Third St San Francisco 24
Calif KOTACOIL—Induction Heating Corp KOTE-LITE—Woodward Machine Co

KOVER-ALL—Jordan Industries Inc
KOVER-GARD—Fanner Mfg Co Electrical Products
Div
Kraeuter & Co Inc 585 18th Ave Newark 3
NJ
KRALASTIC—United States Rubber Co
Kraloy/Chemtrol Co
Kraloy Plastic Pipe Co—see Kraloy/Chemtrol Co
Kraler Ave Santa Ana Calif
Kraloy Plastic Pipe Co—see Kraloy/Chemtrol Co
Kritzer Products Div Peerless of America 5800
N Pulaski Rd Chicago 46 III
KROMOVER—All-State Welding Alloys Co Inc
Krueger & Hudepohl Inc 1041 Evans St Cincinnati 4 Ohio
Kruse-Rieke Auburn Ind
Kuhlman Electric Co P O Box 288 Birmingham
Mich
Kulka Electric Corp 633 S Fulton Ave Mount
Vernon NY
Kurman Electric Co P 191-193 Newel St Brooklyn
22 NY
Kurman Electric Co 191-193 Newel St Brooklyn
22 NY
Kurman Electric Co
Kurtzon (Mooris) Inc 1420 S Talman Ave Chicago 8 III
Kuz & Root Co Inc—see Kurz & Root Sales & Engineering Corp
Kuz & Root Co Inc—see Kurz & Root Sales & Engineering Corp
Kuz & Root Sales & Engineering Corp 232 East
North Island St Appleton Wis
KWIK BAR—Kruse-Rieke
KWIK-KALL—Loge Electronics Inc
KWIK-THERM—Cannon Electric Co
KWIK-KMAL—Loge Electronics Inc
KWIK-THERM—Cannon Electric Co
KWIK-KMAL—Loge Electronics Inc
KWIK-FHERM—Cannon Electric Co
KWIK-KMAL—Loge Electronics Inc
KWIK-FALL—Loge Electronics Inc
KWIK-FALL—Loge Electronics Inc
KWIK-FALL—Loge Electronics Inc
KWIK-FALL—Loge Electronics I

L

LAM Inc 414 Main St Wakefield Mass

LAM Workshop Inc—see LAM Inc

L-M—Line Material Industries

La P Lighting Box 157 Olive Branch Miss

L P I—Lighting Products Inc

LR Mig Co—see Ripley Co Inc

LS-FLOOD—Radiant Lamp Corp

LAB-HEAT—Blue M Electric Co

Labelon Corp Canandaigua NV

Labelon Tape Co Inc—see Labelon Corp

LABSTROBE—Berkshire Laboratories

LACKON—United States Radium Corp

Laclede Steel Co Arcade Bidg St Louis 1 Mo

Laduby Co Inc Boston Post Rd (P 0 Box 88) Bran
ford Conn

LAG SHELDS—Rawlplug Co Inc

Laganke Electric Co—see Lake Shore Electric Corp

LAKE—Mational Time & Signal Corp

Lake Erie Electric Mig Inc 2952 W 22 St Erie

Pa

Lake Mig Co 2323 Chestnut St Oakland Calif

Laile Shore Electric Inc—see Lake Shore Electric

Corp

Lake Shore Electric Mig Co—see Lake Shore Electric

Corp

Lake Shore Electric Mig Co—see Lake Shore Electric

Corp Lake Shore Electric Mig Co—see Lake Shore Electric

Corp Lake Shore Electric Mig Co—see Lake Shore Electric

LAKESHORE—Aitken-Reed Inc

LAKESHORE—Aitken-Reed Inc

LAKEN-Thomas & Betts Co

LAMP SNATCHER—Rich (Phil) Fan Mig Co Inc

Lamp SNATCHER—Rich (Phil) Fan Mig Co Inc

Lamp Lamstofter Products Corp

LAMPLIGHTER—Telsta Corp

Lamplighter Products Co Inc—see Lightalarms Inc

Lancaster Lens Co—see Lancaster Glass Corp

LAMPLIGHTER—Telsta Corp

Lampulighter Products Co Inc—see Central Transformer

Corp

Lampulighter Co Inc Valparaiso Ind

Lancaster Lens Co—see Lancaster Glass Corp

LANCE MARKER—Keyes-Davis Co

Landa-Air Inc 7444 W Wilson Ave Chicago 31

III

Lantz Mig Co Inc Valparaiso Ind

Lapp Insulator Co Inc 35 Gilbert St LeRoy NY

LAQUA—Fidelity Chemical Products Corp

LaRaus Mig Co Inc Valparaiso Ind

Lapp Insulator Co Inc 35 Gilbert St LeRoy NY

LAQUA—Fidelity Chemical Products Corp

LaRaus Mig Co Inc Valparaiso Ind

Lastik Products Inc—see Lastik Paint Co

Larkobe—Fullman Mig Co

LaWED—Velocity Power Tool Co

LAWCO—Velocity Power Tool Co

L

Leach Corp 18435 Susana Rd Compton Calif
LEADER—Keyes-Davis Co
Leader Lamp Mfg Co 476 Broome St NY 13 NY
LEAF-LITE LUMINUS—Luminous Ceilings Inc
LEAK PROOF—Ray-O-Vac Co
LECTERN—Loge Electronics Inc
LECTERN-LYRIC—AOW Corp
LECTRN-LYRIC—AOW Corp
LECTRN-LOK—Steber Div Pyle-National Co
LECTROFILTER—McGraw-Edison Co Albion Div
Lectrohm Inc 5560 Northwest Highway Chicago
30 Ill 30 III
LECTRONIC LECTERN—Radio Corp of America
LECTRONIC SENTRY—Joy Mfg Co
Ledex Inc 123 Webster St Dayton 2 Ohio
LEDLOK—U S Expansion Bolt Co
Lee-Bert Inc 900 Lapeer St Saginaw Mich
Lee (Walter) Chemical Corp—see Emerson Plastics Corporation poration e Electric Inc 566 52nd St West New York Leebaw Mfg Co 65 Wayne Ave Youngstown 2 Leece-Neville Co 1374 E 51 St Cleveland 3 Ohio Leecraft Mfg Co Inc 58 Greene St New York 12 N Leeds & Northrup Co 4970 Stenton Ave Phila 4 Phila 44 Pa LEEFLUOR—Emerson Plastics Corp Leesona Corp P 0 Box 1605 Providence 1 RI Lehigh Fan & Blower Co—see Lehigh Fan & Blower Div Lehigh Fan & Blower Div Fuller Co Catesauqua Pa Leibfried (C H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY Leigh Building Products Cooperville Mich Leitch Engineering Corp—see Leitch-Huard Leitch-Huard Corp Stark & Commercial Sts Man-Lekth ITE—Century Lighting Ine Leitch-Huard Corp Stark & Commercial Sts Manchester NH
LEKOLITE—Century Lighting Inc
LEKTRO-LOK—Linemaster Switch Corp
Leland (G H) Inc—see Ledex Inc
Leland Electric Co 1501 Webster St Dayton 1 Ohio
Lenco Inc 350 W Adams St Jackson Mo
Lenk Mfg Co Franklin Ky
LENOX—Day-Brite Lighting Inc
LENSDRUM—Art Metal Lighting Div
Leonard Electric Mfg Co 3907 Perkins Ave Cleveland
14 Ohio 14 Ohio LEROY—Hirschman-Pohle Co Inc LESTERLITE—Transolite Corp LeTERLITE—Transolite Corp LeTERLITE—Transolite Corp LeTeV-0-LET—Leviton Mfg Co Inc LEV-0-LETE—Leviton Mfg Co Inc LEV-0-LECK—Leviton Mfg Co Inc LEVEL MASTER—Jo-Bell Products Inc LEVEL MASTER—Jo-Bell Products Inc LEVEL WARD—Continental-Diamond Fibre Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY 14 NY LEVOLIER-McGill Mfg Co Inc Lew Electric Fittings Co 627 W Lake St Chicago 6 Lew Lewis Engineering Co 52 rounds.

Conn
Lewis-Shepard Products Inc 125 Walnut St Watertown Mass 1254 W Harrison St Chicago 7 Lewus Electric Co 1254 W Harrison St Chicago 7 III
LEXINGTON—Miller Co
Liberty Bell Mfg Co Swainsboro Ga
Licon Switch & Control Div Illinois Tool Works
6606 W Dakin St Chicago 34 III
Lidseen of North Carolina Inc 1000 First St Hayesville NC
Lidseen (Gustave Inc)—see Lidseen of North Carolina
LIFE GUARD—Dorsey John E Co
LIFE GUARD—Westinghouse Electric Corp Lamp Div
LIFE-INE—Westinghouse Electric Corp
LIFE-SIZE—Auth Electric Corp
LIFE-TITE—Anderson Electric Corp
LIFE-TITE—Anderson Electric Corp
LIFE-TITE—Anderson Electric Corp
LIFE-TITE—Salter Electric & Mfg Co Inc
LIFETIME—Slater Electric & Mfg Co Inc
LIFETIME—Slater Electric & Mfg Co Inc
LIFT-ADD—Alliance Mfg Co Inc
LIFT STACKER—Allied Mfg & Sales Co
Lift Trucks Inc 2425 Spring Grove Ave Cincinnati 14
Ohio
LIFTAMATIC—Sascen Derrick Co Lift Trucks Inc 2422 apring grove and Cohio Ohio
LIFTAMATIC—Sasgen Derrick Co
LIFTRUK—Silent Holist & Crane Co
Light & Power Utilities Corp—see L & P Lighting
LIGHT WATCHMAN—Ripley Co Inc
Lightlalarms Inc 95 Atlantic Ave Brooklyn 1 NY
LIGHTER LITE—Cable Electric Products Inc
LIGHTGUARD—Exide Industrial Div
LightIng Dynamics Inc 300 N Baldwin Park Blvd City
of Industry Calif
Lighting Products Inc 1549 Park Ave West Highland
Park III
Lightmore Appliance Corp 651-5 Driggs Ave Brook-Park III
Lightmore Appliance Corp 651-5 Driggs Ave Brooklyn 11 NY
LIGHTNING—Vaco Products Co
LIGHTNING LIFT—Atlas Overhead Door Co
Lightning Protection Engineers—see Security Mfg &
Contracting Co
Lightolier Inc 346 Claremont Ave Jersey City 5
NJ
Lightnings P. D. Roy 7213 Colling Confe NEJ Lightonics P O Box 7211 Oakland Calif LIGHTRON—Condi-Lite Corp LIGHTSCAPER—Magni Flood Inc LIGHTSCAPER—Shalda Mfg Co Inc LIGHTWARDEN—Electric Cord Co LIGHTWHEEL—Silvray Lighting Inc Lima Electric Motor Co Inc Findlay Road Lima Ohio LIMB-LOPPER—Miller-Robinson Co LIMIT-LOAD—Buffalo Forge Co LIMITAMP—General Electric Co LIMITRON—Bussmann Mfg Div McGraw-Edison Co

LINABESTOS—Keasbey & Mattison Co LINC-THAW—Lincoln Electric Co LINCOLN—Forston Co LINCOLN—Sangamo Electric Co Lincoln Electric Co 22801 St Clair Ave Cleveland 17 LINCOLNDUCTOR-Lincoln Electric Co LINCOLNTROL—Lincoln Electric Co
LINCOLNTROL—Sangamo Electric Co
LINCOLNWELD—Lincoln Electric Co
LINCOLNWELD—Lincoln Electric Co
LINCWELDER—Lincoln Electric Co
Lindberg Engineering Co 2450 W Hubbard St Chicago Lindberg Engineering Co 2450 W Hubbard St Chicago 12 III Lindell Electric Control Corp 384 Canal St New York 13 NY LINE-A-MATIC—Stromberg Div General Time Corp LINE-A-SPEDE—Allis (Louis) Co LINE-A-RC—Square D Co Electric Controller & Mfg LINE-ARC—Square D Co Electric Controller & Mfg
Div
Line Electric Co 229 River St Orange NJ
LINE-FLEX—Perfect-Line Mfg Corp
Line Material Co—see Line Material Industries
Line Material Industries McGraw-Edison Co 700 W
Michigan St Milwaukee Wis
LINE-0-HEAT—Smith-Gates Corp
LINE-0-LAMPS—Wiremold Co
LINE-0-METER—Simpon Electric Co
LINE-0-METER—Simpon Electric Co
LINE-O-METER—Simpon Electric Co
LIQUATITE—Electric-Fiex Co
LIQUATITE—Electric-Fiex Co
LIQUID ICE—Cool-ette Inc Broadway New York 18 NY
LIQUATITY — Electri-Fiex Co
LIQUID ICE—Cool-ette Inc
LIQUID TITE—Electri-Fiex Co
LIQUID TITE—Electri-Gal Fittings Corp
LITE ENDX—Guth (Edwin F) Co
LITE LINER—House-O-Lite Corp
LITE MITE—House-O-Lite Corp
LITE—NTFF—Hamilton Caster & Mfg Co
LITE—NPOSE—Amprobe Instrument Corp
LITE-UR-WAY—Edco International Corp
Litecontrol Corp 36 Pleasant St Watertown 72
Massa
LITEKRAFT—Cole (C W) & Co Inc
LITEMASTER—Art Specialty Co
LITEMASTER—Art Specialty Co
LITEMASTER—Flexo International Corp
LITHE MSTER—Globe Lighting Products Inc
Lithonia Lighting Products Co Box 206 Conyers
Littleffuse Inc 1865 Miner St Des Plaines III
LITTLE CHAMP—Champion DeArment Tool Co
LITTLE SUCH—Alkco Mfg Co
LITTLE SUCH—Alkco Mfg Co
LITTLE MICH—Alkco Mfg Co
LITTLE SUCH—Alkco Mfg Co
LITTLE WIZARD—Round (David) & Son Inc
Littleford Bros Inc 453 E Pearl St Cincinnati 2
Ohio
Lloyd Johnson Co—see Johnson Mfg Co Inc LITTLE WIZARD—Round (David) & Son Inc Littleford Bros Inc 453 E Pearl St Cincinnati 2 Ohio
Ohio
Lloyd Johnson Co—see Johnson Mfg Co Inc
LLOYDS—Johnson Mfg Co Inc
LLOYDS—Johnson Mfg Co Inc
LO-HET—Hollophane Co Inc
LO-HED—A E Industrial Div Aircraft Armaments Inc
LO-HED—A E Industrial Div Aircraft Armaments Inc
LO-LOSS—National Electric Div H K Porter Co
LO-NOIZ-LEVEL—Allen Cooler & Ventilator Inc
LO-UNE Metropolitan Electric Mfg Corp
LO-VOLT—Industrial Devices Inc
LO-X—I-T-E Circuit Breaker Co BullDog Electric
Products Div
LO-Z—Metropolitan Electric Mfg Corp
LOAD—LIFT—American Pulley Co
LOAD LIFTER—Shaw-Box Crane & Holist Div Manning
Maxwell & Moore Inc
LOAD-MOBILE—American Pulley Co
LOAD SENTRY—Assembly Products Inc
LOADBUSTER—S & C Electric Co
LOADBUSTER—See Electric Co
LOADBUSTER—See C Electric Co
LOADBUSTER—Evensylvania Transformer Div
LOADSTAR—Leland Electric Co Inc
LOANSTAR—Leland Electric Co Inc
LOCK-TITE—Thomas & Betts Co
LOCKITTE—Westinghouse Electric Corp Lighting Div
LOCTITE—American Sealants Co
LOCKLITE—Westinghouse Electric Corp Lighting Div
LOCTITE—American Sealants Co
LOCKSTITE—Mestinghouse Electric Corp Lighting Div
LOCTITE—American Sealants Co
LOCKSTITE—Holib Industries Inc
LOK-ATIE—Thomas & Betts Co
LOCK-TITE—Holib Industries Inc
LOK-ATOR—Edwards Co Inc
LOK-TOR—UN Sexpansion Bolt Co
LONG-BELL—International Paper Co Park III

LONG-BELL.—International Paper Co

Long-Bell Lumber Co—see International Paper Co

LONG-LIFE—Goodall Rubber Co

LONG-LIFE—Marvel Lamp Co LONGRIP—Ridge Tool Co LOOV-0-LITE—Guth (Edwin F) Co Lord-Taber Co Inc—see Castle Engineering Co LORRAINE—Carbone Corp LOSHAFT—Franklin Electric Co Inc LOTEMP—Micro Instrument Co LOUVE-ROCKET—Sun-Lite Mfg Co LOUVERAY-Duro-Test Corp

LOUVRON—Lightolier Inc
LOVEX—Day-Brite Lighting Inc
LOVOLT—Woodhead (Daniel) Co
Lovsted (CM) & Co Inc
Seattle 6 Wash
LOW-PEAK—Bussmann Mfg Div
LOXARMOR—Okonite Co
LOXIN—Star Expansion
LOXON—McGill Mfg Co Inc
LOXSWITCH—Denison (RB) Mfg Co
LUB Jack Co—see Earthworm Boring Machine Inc
LUBO\_LET—Trico Fuse Mfg Co
LUCETTE—Versen (Kurt) Co
Lucifer Furnaces Inc
LUCO—Lukens (Thos F) Metal Co
LUGUTG—Hornors Sales Co P 0 Box 101 Needham
Heights 94 Mass
Lug-All Co—see Handy Angle Div Lug-All Co
LUG-IT—Thomas & Betts Co
Lukens (Thos F) Metal Co Hedley & Bath Sts Philadelphia 37 Pa
LUMA-CEILING—Pittsburgh Reflector Co
Luma Electric Equipment Co 1607 Coining Drive
(P 0 Box 132) Toledo Ohio
LUMAROL—Micro Balancing Inc
Lumen Inc Moen Ave (P 0 Box 905) Joliet III
LUMEN-REA—Electro Lighting Corp
LUMENITE—Coilyer Insulated Wire Co
Lumentie Electronic Corp 407 S Dearborn St Chicago
Si
Lumi Dyne Corp 627-39 Banning St Los Angeles 12
Calif
LUMI-POST—Silvray Lighting Inc
LUMI-ROM—Poliak Luminescent Corp
LUMITRON—Metropolitan Electric Cable
Co
LUNT-LOW-Poliak Luminescent Corp
LUMI-POST—Silvray Lighting Inc
LUMI-ROM—Poliak Luminescent Corp
LUMI-ROM

#### M

M-SCOPE—Fisher Research Laboratory Inc
ME—Marathon Electric Mfg Corp
M H Standard Co—see Versabar Corp
MP—Murry Mfg Corp
MPAC—Cutler-Hammer Inc
M S A SHOCKGARD—Mine Safety Appliances Co
M & T—Metal & Thermit Corp
M & T Welding Products Corp 703 37th Ave Oakland
Calif
MTC—Marcus Transformer Co Inc
M & W Electric Mfg Co Inc S Walnut St (P O Box
87)—Est Palestine Ohio
MACHETA—Aerowent Fan Co Inc
Machinery Electrification Inc 56 Hudson St Northboro Mass
Machinery Electrification Inc 56 Hudson St Northboro Mass
Madison Equipment Co 5405 Detroit Ave Cleveland 2
Ohio
MAGA-TROL—Ward Leonard Electric Co
MAG-EYE—Square D Co
MAGA-TROL—Ward Leonard Electric Co
MAGA-TROL—Ward Leonard Electric Co
MAGAIC TARAN—Mid-States Welder Mfg Co
MAGAIC TARAN—Mid-States Welder Mfg Co
MAGAIC TOUGH—Rodale Mfg Co Inc
MAGIC TOUGH—Rodale Mfg Co Inc
MAGIC TOUGH—Rodale Mfg Co Inc
MAGICLITE—Guth (Edwin F) Co
MAGMA—Airsworth Lighting Inc
MAGMA—Airsworth Lighting Inc
MAGNA—Auto Arc-Weld Mfg Co
MAGNA—Ster Motor Products Co
MAGNA—Arthan—Mid-States Welder Mfg Co
MAGNA—Ster Motor Co
MAGNA—Ster Motor Co
MAGNA—Ster Motor Co
MAGNA—Ster Motor Products Co
MAGNA—Mid-States Welder Mfg Co
MAGNA—Ster Motor Products Co
MAGNA—Birsworth Lighting Inc
MAGNA-Ster — Orceision Thermometer & Instrument Co
MAGNA WELDER— Orceision Thermometer & Instrument Co
MAGNA WELDER— Orceision Thermometer & Instrument Co
MAGNA W

Magnetic Amplifiers Inc—see Siegler Corp Magnetic Amplifiers Div
Magnetics Inc Box 391 Butler Pa
MagNetTRIP—Zinsco Electric Products
Magnetrol Inc 2110 S Marshall Blud Chicago 23 III
MAGNETTE—Heinemann Electric Co
Magni Flood Inc 50 Crary Ave Mt Vernon NY
MAGNI-WHIRL—Blue M Electric Corp
MAGNI-WHIRL—Blue M Electric Corp
MAGOHM—Electric Regulator Corp
MAGOHM—Electric Regulator Corp
MAIN STREETER—Westinghouse Electric Corp
Lighting Div MAIN STRETER—Westinghouse Électric Corp Lighting Div
MAINLINE—Crane (HW) Co
MAINLINE—Westinghouse Electric Corp Lighting Div
Majestic Metal Spinning & Stamping Co Inc 537
Sackett St Brooklyn I7 NY
MAJOR—Gem Electric Mfg Co Inc
Major Equipment Co Inc 4603 W Fullerton Ave
Chicago 39 III
MAL-LEADS—Arro Expansion Bolt Co
Mail Tool Co 25000 S Western Ave Park Forest III
MALLDRILL—Mail Tool Co
Mailory (P R) & Co Inc 30 S Gray St Indianapolis 6
Ind MALLSAW—Mail Tool Co MANCHEX—Exide Industrial Div Electric Storage Bat-MANURID — Driver (Wilbur B) Co MANHATTAN — Raybestos-Manhattan Inc Manning (RA) Associates—see Manning (RA) Co Inc Manning (RA) Co Inc 1810 North Ave Sheboysa Manning (KA) Co Inc 1810 North Ave Sneboygan Wis Manning Maxwell & Moore Inc 250 E Main St Stratford Conn MANSUN—Major Equipment Co Inc MAPLAC—Chance (A B) Co Marathon Battery Co P 0 Box 298 Wausau Wis Marathon Electric Mfg Corp Wausau Wis Marathon Electric Mfg Corp Wausau Wis Marathon Special Products Corp 12th & Cranberry Sts Erie Pa Marbelite Co Inc 179 N 10 St Brooklyn 11 NY Marbic Card Electric Corp—see Marble Electric Corp Marble Electric Corp Gladstone Mich MARCO—Progress Mfg Co Inc MARCO—Progress Mfg Co Inc MARCO—To St Helena St Anaheim Calif MARCOFLEX—Marco Industries 207 S Helena St Anaheim Calif MARCOFLEX—Marco Industries Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Marcus Macro Industries Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Marcus Transformer Co Inc Leeville Ave Rahway Nacro Industries Mfc Cox 100 Marcus Transformer Co Inc Marcus T MARGLO—Marvin Electric Mfg Co Marine Electric Co 195 Fremont San Francisco Calif
Marion Electrical Instrument Co—see Marion Instrument Div Minneapolis-Honeywell Regulator Co
Marion Instrument Div Minneapolis-Honeywell Regulator Co Grenier Field Manchester NH
Mark Clayton) & Co 1900 Dempster St Evanston
III Marine Calif MARK-TIME—Rhodes (M H) Inc MARKARRIER—Premax Products Div Chisholm-Ryder Co Inc Markel Electric Products Inc 145 Seneca St Buffalo NY 3 NY
Markel (L Frank) & Sons Norristown
Market Forge Materials Handling Equipment—see
American Pulley Co
Marks Mfg Co 700 N Carpenter St Chicago 22 III
MARKSMAN—West Instrument Corp
Marksome Mfg Co 1551 N Kingsbury Chicago 22 Markstone mrg up Illinois
Marlou Lights Inc Fanwood NJ
Marquette Electric Switchboard Co 311 N Desplaines
St Chicago 6 Ill
MARR—Rattan Mfg Co
Marsh (Jas P) Corp—see Marsh Instrument Company
Marsh Heating Equipment Corp—see Marsh (Jas P)
Corp Marsh Heating Equipment Corp—see Marsh (Jas P)
Corp
Marsh Instrument Co 3501 Howard St Skokie III
Marsh Refrigeration Equipment Co—see Marsh (Jas P)
Corp
Marshall (John) Associates Inc Box 2463 Bridgeport
8 Conn
Martin Fan & Blower Co 4634 W 21st P1 Chicago
50 III
Martin Stamping & Stow Co Electric Heater Div 50 III
Martin Stamping & Stove Co Electric Heater Div
P O Box 259 Huntsville Ala
Martindale Electric Co 1383 Hird Ave Cleveland 7 Martindale Electric Co 1383 Hird Ave Cleveland 7
Ohio

MARTLITE—Ainsworth Lighting Co
MARVEL—Pullman Vacuum Cleaner Corp
MARVEL—United Electric Motor Co
Marvel Fluorescent Mfg Co—see Marvel Lamp Co
Marvel Fluorescent Mfg Co—see Marvel Lamp Co
Marvel Rack Mfg Co Inc 96 43rd Ave N E Minneapolis 21 Minn
MARVELITE—Marvel Lamp Co
Marvin Electric Mfg Co 648 Santa Fe Ave Los
Angeles 21 Calif
Marvin Mfg Co—see Marvin Electric Mfg Co
Marvinay Inc—see Seaboard Products Corp
Maryland Lava Co Box 127 Bel Air Md
MASCOT—ONE—Simpson (Mark) Mfg Co Inc
MASCOT—Simpson (Mark) Mfg Co Inc
Mason (LE) Co 98 Business St (Hyde Park) Botton
36 Mass
Massey (A H) Inc 111 3rd St (P O Box 206) Derby Massey (A H) Inc 111 3rd St (P 0 Box 206) Derby Conn Conn
Massey-Ferguson Industrial Div Massey-Ferguson Inc
1009 S West St Wichita 13N Kans
MASTER—Kaiser Aluminum of Chemical Sales Inc
Master Electric Div Reliance Electric & Engineering
Co 24701 Euclid Ave Cleveland Ohio MASTER-LIGHT—Carpenter Mfg Co MASTER-MITE—Marsh Instrument Co MASTER-PRO—Cincinnati Time Recorder Co MASTER-TEST-Marsh Instrument Co

MASTERBEAM—MiroFlector Co Inc
Mastercraft Plastics Co Inc 95-01 150th St Jamaica
35 NY
MASTERGUARD—Electric Distribution Products Inc
MASTERGUARD—Electric Distribution Products Inc
MASTERLINE—Blonder-Tongue Laboratories Inc
MASTERLINE—Blonder-Tongue Laboratories Inc
MASTERLINE—Slonder-Tongue Laboratories Inc
MASTERLINE—SPS Kensington Ave Phila Pa
MATCHLESS—Chisholm-Moore Hoist Div
MAX-FLD—Shaw-Perkins Mfg Co
MAXAW—Cummins Portable Tool Div John Oster Mfg
Co MAXAW—Cummins Portable Toel Div John Oster Mfg Co
Maxwell Equipment Co—see United States Air Conditioning Corp
McGabe-Powers Body Co 5900 N Broadway St Louis 15 No
McCaffrey Mfg & Supply Co 1840 W 14 St Chicage 3 III
McCARTHY—Salem Tool Co
McCarthy Electric Co 9640 Grinnell Detroit 13 Nich
McCorpic (D H) Co Box 97 Station A Berkeley Calif
McDonald Mfg Co—see Sierra Electric Corp
McDonnell & Miller Inc 3500 N Spaulding Ave Chicago 1 III cago 18 III
McFarland (L D) Co McFarland Bidg Sandpoint Idaho
McGill Mfg Co Inc Valparaiso Ind
McGilw-Gison Co Albion Div 704 Clark St N
Albion Mich
McK—McKinley (Ben P) Co
McKee Div Thatcher Glass Mfg Co Inc Jeannette Pa
McKee Glass Co—see McKee Div Thatcher Glass Mfg
Co Inc Co Inc Co Inc McKinley (Ben P) Co 522 S Clinton St Chicago 7 III McKinley-Mockkenhaupt Co—see McKinley (Ben P) Co McLarty Systems 2600 Dickman Rd Battle Creek MEGOHM TEST—Davemport wing bir boncan Executive Co Inc MEGOHMER—Sticht (Herman H) Co Inc MEGOHMER—Sticht (Herman H) Co Inc 3525 E Washington St Indianapolis 7 Ind Meier Johan-Wengler 1102 W 9th St Cincinnati 3 Ohio. ington St Indianapolis 7 Ind
Meieriohan-Wengler 1102 W 9th St Cincinnati 3
Ohio
MEK—Machinery Electrification Inc
MEKONTROL—Machinery Electrification Inc
MELOCAL—Edwards Co Inc
MELODY BELL—Gable Electric Products Inc
MELOPY BELL—Cable Electric Products Inc
MEMOTRON—Hughes Aircraft Co
Memorate Hender Berger Berger
MEMOTRON—Hughes Aircraft Co
Memorate Electric Co
MERCA-AMATIC—Tigerman Engineering Co
MERCA-AMATIC—Tigerman Engineering Co
MERCA-AMATIC—Tigerman Engineering Co
MERCA-COO—Appleton Electric Co
MERCA-MATIC—Great Northern Mfg Corp
MERCO-FLOOD—Radiant Lamp Corp
MERCO-FLOOD—Radiant Lamp Corp
MERCO-WHITE—Great Northern Mfg Corp
MERCO-WHITE—Great Northern Mfg Corp
MERCO-WHITE—Mercoid Corp
MERCON-MITE—Mercoid Corp
MERCUN-TIE—Great Northern Mfg Corp
MERCON-MITE—Mercoid Corp
MERCUN-TIE—Sterner Industries
MERCURY—General Control Co
MERCURY—Violan Electric Co
Mercury Mfg Co 4700 W Division St Chicago III
Mercury Products Inc Boston Post Rd Guilford Colo Mercury Products Inc Boston Post Rd Guilford Conn Mercury Products Inc Boston Post Rd Guilford Conn Merwin Mfg Co 19th & German Sts Erie Pa MET—Metropolitan Electric Mfg Corp METAL MASTER—Wiss (J) & Sons Co METAL ROLLING—American Silver Co Metal & Thermit Corp Rahway NJ METALCEL—Fannon (John J) Products Co Metalcraft Products Co Inc 6225 State Rd Philadelphia 35 Pa Metalectrics Inc 627 Greenwich St New York 14 NY METALEX—Willard Storage Battery Div Electric Storme me ca — while of our age battery Div Electric Storage Battery Co Metals & Control Div Texas Instruments Inc—see Metals & Controls Inc Metals & Controls Inc 34 Forest St Attleboro Mass
METARAY—Wiegand (Edwin L) Co
METCO LIGHTING—Metalcraft Products Co Inc
METEOR—Associated American Winding Machim
METEOR—Chisholm-Moore Hoist Div METEOR—Metalcraft Products Co Inc METEOR—Wheeler Reflector Co Meteor Electric Co Inc—see Leviton Mfg Co Inc
Meteor Mfg Corp Emporium Pa
Meter Devices Co 1001 Prospect Ava SW Canton 6 Ohio METER-MATIC-International Register Co

METER-MATIC—Leitch-Huard Corp Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind METL-CAN—Pyramid Electric Co Metro Casting Co Inc 47 Grattan St Brooklyn 37 MV Metron Instrument Co 432 Lincoln St Denver 3 Colo Metropolitan Device Corp—see Murray Mfg Corp Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 NY Metropolitan Switchboard Co—see Metropolitan Electric Mfg Corp Meyer Machine Inc Red Wing Minn Mica Fabricating Co 53 Central Ave Rochelle Pask NJ Mica Fabricating Co 53 Central Ave Rochelle Park NJ MICA-GLAS—National Electric Coil Div MICA-GLAS—National Electric Coil Div Mica Products Mfg Co—see Mica Fabricating Co MICABOND—Continental-Diamond Fibre Micacraft Products Inc 701-03 McCarter Highway Newark 5 NJ MICALITE—Induction Heating Corp MICEPAK—Electric Products Co Michigan Fluorescent Light Div 393 Orchard Lake Ave Pontiac Mich Michigan Oven Co 415 Brainard Detroit 1 Mich Michigan Oven Co 415 Brainard Detroit 2 Mich Michigan Oven Co 40 Trowbridge St Cambridge 38 Mass Mass MicRELAY—Ebert Electronics Corp Micro Balancing Inc 191 Herricks Rd Garden City Pk NY MICRELAY—Ebert Electronics Corp
Micro Balancing Inc. 191 Herricks Rd Garden City
Pk. NY
MICRO-LITE—Burton Mfg Co
MICRO-MOTOR—Redmond Co Inc.
MICRO-MAMIC—Micro Balancing Inc
MICRO-MAMIC—Micro Balancing Inc
MICRO-MOTOR—Redmond Co Inc.
MICRO POWER—United States Motors Corp
Micro Switch Corp—see MICRO SWITCH Div
MICRO SWITCH Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport III
MICROFIN—Wiegand (Edwin L) Co
MICROFIN—Simpson Electric Co
MICROSTAT—Kent Co Inc
MICROFINE—Raytheom Mfg Co
MICROFINE—Revented Mfg Co
MICROFINE—Revented Mfg Co
MICROFINE—Revented Mfg Co
MIDG-T—Electro Devices Inc.
MID-RIP—General Cable Corp
MID-RIP—Sevivelier Co Inc
MID-RIP—Sevivelier Co Inc
MID-RIP—Swivelier Co Inc
MIDGET—Swivelier Co Inc
Midget Heater & Specialty Co 2801 Pacific Ave
Tacoma 4 Wash
MIDGET-Ray—Duray Fluorescent Mfg Co
MIDGET TALK—Simpson (Mark) Mfg Co Inc
MIDGET MARTISON Pee SW Canton 1 Onio
Middand Paint & Varnish Co—see Harrison Paint &
Varnish Co
Middand Wire Corp—see Paranite Wire & Cable Div
Essex Wire Corp
Midwest Electric Mfg Co 1639 Walnut St Chicago
12 III
Midwest Electric Products Inc 1515 N Front St Midwest Electric Mfg Co 16.39 Walnut St Chicago 12 III
Midwest Electric Products Inc 1515 N Front St Mankato Minn
Midwest Lighting Products Co P O Box 536 Edgewater Branch Cleveland 7 Ohio
MIGHTY MIDGET—Coffing Hoist Div
MIGHTY MIDGET—Calanley Power Tools Div
MIGHTY-MITE—Declaheat Inc
MIGHTY MITE—Mechanical Industries Production Co
MIGHTY MITE—Mechanical Industries Production Co
MIGHTY MITE—Mechanical Industries Production Co
MILESTONE—Jefferson Electric Co
MILL-O-MATIC—Lixor Lighting Products Inc
Miller Co Illiminating Div 99 Center St Meriden
Conn
Conn
Miller (Sanford) Co—see Sanford Miller Co Inc
Miller Electric Mfg Co Inc 7.18 S Bound St Pawtucket RI
Miller Electric Mfg Co Inc 7.18 S Bound St Appleton
Wis Miller Equipment Co Inc 13th & New Streets Franklin Pa Miller Harris Instrument Co 1134 S First St Milwaukee 4 Wis Miller (T R) Mill Co Inc Brewton Ala Miller-Robinson Co 7007 Avalon Blvd Los Angeles 3 Miller-Robinson Co 7007 Avalon Blvd Los Angeles 3
Calif
Millerbernd Mfg Co Winsted Minn
Millers Falls Co 57 Wells St Greenfield Mass
MILLI-V-METER—Howell Instruments Inc
MILLITE—Westinghouse Electric Corp Lighting Div
Milos System Devices—see United States Petroleum Co
MILWAUKEE—Northern Light Co
MILWAUKEE—Northern Light Co
Milwaukee Electric Tool Corp 5368 W State St
Milwaukee 8 Wis
Milwaukee Parts Corp 607-15 S Sixth St Milwaukee
4 Wis
MIN-A-CLIPS—Minerallac Electric Co
MINALITH—Koppers Co Inc Wood Preserving Div
Mine Safety Appliances Co 201 N Braddock Ave
Pittsburgh 8 Pa
MINEON—Drake Mfg Co
MINERALIGHT—Ultra-Violet Products Inc
Minerallac Electric Co 25 N Peoria St Chicago 7
III Mines Equipment Co—see Jov Mfg Co Electrical Prod-ucts Div MINI BREAKER-Mechanical Products Inc MINI-CELL—Neo-Ray Products Inc MINI-GATOR—Mueller Electric Co MINI-ISOLATOR—Javex Electronics MINI-LARM—Russell & Stoll Co Inc MINI-MARKER-Westline Products Div Western Lithograph Co
MINI-PLATES—Javex Electronics
MINI-SOCKET—Javex Electronics MONOMAST—Hyster Co ,
MONOWELD—All-State Welding Alloys Co Inc

MINI-TIPS—Ungar Electric Tools
MINI-VOLT—Industriat Devices Inc
MINICUSE—Fullerton Mfg Co
MINIRELAY—Ebert Electronics Corp
Minneapolis 3 Minn
Minneapolis 3 Minn
Minneapolis 5 Minn
Minneapolis 6 Minn
Minneapolis 6 Minn
Minneapolis 7 Minn
Minneapolis 7 Minn
Minneapolis 8 Minn
Minneapolis Minn
Minneapolis Minn
Minneapolis Minn
Minneapolis Minn
Minneapolis Minn
Minneapolis Mfg Co Electrical Products Div
900 Bush Ave St Paul 6 Minn
Minneapolis Mining & Mfg Co Irvington Div 900 Bush
Ave St Paul Minn
Minneapolis Mining Minneapolis Mining Minneapolis Mining & Minneapolis Mining Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio
MISSILITE—Marco Industries
MISSING LINK—Mid-State Welder Mfg Co
Mission Appliance Corp Hyde Park Station Los
Angeles 43 Calif
Mission Western Engineers Inc—see Western Gear Corp
Mitchell Industries Inc Box 17 Municipal Airport
Mineral Wells Tex
Mitchell Lighting Div Compco Corp 1800 N Spaulding Ave Chicago 47 III
Mitchell Mfg Co 3200 W Peterson Ave Chicago 45
III Mitchell Moulding Co 1501 Circle Ave Forest Park

III

Mitchell Rand Insulation Co 51 Murray St NY 7 NY

Mitchell Rand Insulation Co 51 Murray St NY 7 NY

Mitchell Rand Insulation Co 51 Murray St NY 7 NY

Mitchell Rand Insulation Co

MITE—Amitchell Moulding Co

MITE—International Electric Fence Co Inc

MIT.MAST—Utility Service Go Inc

MIT.MAST—Electric Lighting Inc

MOBILEX—Normal Co

Modern Light Co Inc

Modern Light Co Inc

Modern Light Co Inc

Modern Swimming Pool Co Inc 1 Holland Ave White

Plains NY

Modern Telephone Corp—see Roche (Paul C) Co Inc

MoDERNAIRE—Electro Lighting Corp

MODU-MANE—United States Air Conditioning Corp

MODU-MOUNTE—Mair Electric Mfg Co

MODULITE—Mair Equipment Co Inc

MOHAWK—Frigid Inc

MOHAWK—Frigid Inc

MOHAWK—Frigid Inc

MOHAWK—Surrette Storage Battery Co Inc

MOHAWK—Frigid Inc

MOHAWK—Surrette Storage Battery Co Inc

MOHAWK—Surrette Storage Battery Co Inc

MOHAWK—Surrette Storage Battery Co Inc

MOISTURE MAGNET—Remington Corp

Moderage Corp

MODICA Survey Storage Battery Co Inc

MOHAWK—Surrette Storage Battery Co Inc

MOHAWE—Surrette Mitchell Moulding Co 1501 Circle Ave Forest Park MOIST-O-GRAPH—Minneapolis-Honeywell Regulator Co Industrial Div MOISTURE MAGNET—Remington Corp Moldcast Mfg Co 236 South St Newark 5 NJ MOLDOCHILL—Capewell Mfg Co MOLE—Burndy Corp Mole-Richardson Co 937 N Sycamore Ave Hollywood 38 Calif MOLEFIECTOR—Mole-Richardson Co MOLEVATOR—Mole-Richardson Co MOLEVATOR—Mole-Richardson Co MOLIMITER—Burndy Corp MollMITER—Burndy Corp MollMITER—Burndy Corp Sychology Corp 230 N Fifth St Reading Pa Moloney Electric Co 5390 Bircher Blvd St Louis 20 Mo MON-O-LAG—Monarch Electric Div El-Tronics Inc
Mona Industries Inc Paterson 17 NJ
MONAMINE—Mona Industries Inc
Monarch Electric Corp—see Monarch Electric Div
El-Tronics Inc
Monarch Electric Div El-Tronics Inc 118 E First
St Jamestown NY
Monarch Fuse Co Ltd—see Monarch Electric Div
El-Tronics Inc
Monarch Lighting Figtures Corp—see Ender-Monarch Monarch Lighting Fixtures Corp—see Ender-Monarch Corp MONASTRIP—Mona Industries Inc MONASTRIP—Mona Industries Inc
MONELITE—Dockson Corp
Monitor Controller Co—see Monitor Controller Div
Atlee Corp
Monitor Controller Div Atlee Corp 99 Grove St
Rockland Mass
MONITROL—Monitor Controller Div Atlee Corp
MON0-BOLT—Chance (A B) Co
MONO MOTOR—Redmond Co Inc
MONOGRAM—Refrigerating Specialties Co
MONOLARM—Russell & Stajil Co Inc
MONOLARM—Tussell & Stajil Co Inc
MONOMAST—Hyster Co ,

Moon Mfg Co 108 N Jefferson St Chicago 6 III MOORE—Chisholm-Moore Hoist Div MORELITE—Rambusch Decorating Co MORPHO—Cannon Electric Co MORPHO—Cannon Electric Co Morrison Steel Products Inc 601 Amherst St Buffalo 7 N Co 600 M M Modison St Chicago 6 III Morrow Co 400 W Madison St Chicago 6 III Morse (Frank W) Co 354 Congress St Boston 10 Morse (Frank W) Co 354 Congress St Boston 10
Mass
Morse Chain Co Borg Warner Corp Ithaca NY
Mossman (Donald P) Inc P 0 Box 265 Brewster NY
MOTHER'S HELPER—Simpson (Mark) Mfg Co Inc
MOTO-LIFT—Safway Steel Products Inc
MOTO-Truc Co 1953 E 59 St Cleveland 3 Ohio
MOTODRIVE—Reeves Pulley Div Reliance Electric
& Engineering Co
MOTOMOUNT—New Steel Composition of the Motor Generator Corp—see Hobart Bros
MOTOR SENTINEL—Bryant Electric Co
MOTOMO SPENTINEL—Bryant Electric Co
MOTOR SENTINEL—Bryant Electric Co
MOTOR SENTINEL—Bryant Electric Co
MOTOR SPENTINEL—Bryant Electric Electric
Wis Motor Specialty Inc 2801-17 Lattrop Ave Racine Wis Motor X Products Co—see Industrial Electric Switches of Indiana MOTORDOR—Broan Mfg Co Inc MOTORDOR—Broan Mfg Co Inc MOTORDUCERS—Falk Corp Motorescarch Co 1600 Junction Ave Racine Wis MOTORLITE—Ward Leonard Electric Co MOTORLITE—Ward Leonard Electric Co MOTORLITE—Ward Leonard Electric Co MOTORLITE—Ward Leonard Electric Co MOTORTOR—Bussmann Mfg Div McGraw-Edison Co MOTOTROL—Automatic Control Co MOTOTROL—Automatic Control Co MOTOTROL—Automatic Control Co MU-STAT—Precision Thermometer & Instrument Co Mu-STAT—Precision Thermometer & Instrument Co Mueller Climatrol Div Worthington Corp 2005 W Okiahoma Ave Milwaukee 1 Wis Mueller Electric Co 15556 E 31 St Cleveland 14 Ohio Ohio
Mueller (L J) Furnace Co—see Mueller Climatrol Div
Mullenbach Electrical Mfg Co—see Mullenbach Div
Mullenbach Div Electric Machinery Mfg Co 2100 E
27 St Los Angeles 58 Calif
Mult-A-Frame Corp 6401 Epworth Blvd Detroit 10
Mich Mullenbach Div Electrical Mfg Co—see Mullenbach Div Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Califf Mult-A-Frame Corp 6401 Epworth Bivd Detroit 10 Mich Mult-A-Frame Corp 6401 Epworth Bivd Detroit 10 Mich Mult-A-Frame Div Ainsworth Precision Castings—see Mult-A-Frame Corp Of America Mult-I-GALKS—Rawlplug Co Inc Mult-I-GALKS—Rawlplug Co Inc Mult-I-GALKS—Rawlplug Corp of America Mult-I-DIAMETER—U S Expansion Bolt Co Mult-I-DIAMETER—U S Expansion Bolt Co Mult-I-MUNT—Blackburn (Jasper) Corp Mult-I-SIZE—Diamond Expansion Bolt Co Inc Mult-I-Galtham Colombur Mult-I-TAP—Woodhead (Daniel) Co Mult-I-Galtham Colombur Corp Mult-I-Farame Corp Mult-I-Farame Corp Mult-I-Farame Corp Mult-I-Farame Mult-I-Farame Corp Mult-I-Galtham Colombur Corp Mult-I-Galtham Colombur Colomb MV MUSI-TALK—Fanon Electronic Industries Inc Mutual Foundry & Machine Co—see Potter & Rayfield Inc
MY-T-MIDGET—American Rectifier Corp
Mycalex Corp of America 125 Clifton Blvd Clifton
NLI NLI Myers Electric Products Inc 3019 S Vail Ave Los Anaeles 22 Calif Mystik Adhesive Products Inc 2635 N Kildare Ave Chicago 39 III

NE—National Electric Div H K Porter Co
N E BEND—Burbank Electrical Products
NEM—National Engineering & Mfg Co
N J—New Jersey Porcelain Co Inc
N L Corp 2480 E 22 St Cleveland 15 Ohio
N T C—Keystone Carbon Co Inc.
N W L—Nothelfer Winding Labs Inc
N Y Revolving Portable Elevator Co—see Revolvator Co NAIL-IT-Eagle Electric Mfg Co Inc NAILIN—Rawiplug Co Inc NALCO—National Lead Co NALCO—North American Electric Lamp Co NALCOBRITE—North American Electric Lamp Co Nankervis (Geo L) Co 15300 Fullerton Ave Detroit 27 Mich NARADRECT-Narragansett Wire Co

MONSON-Portland-Monson Slate Co

NARADUCT—Narragansett Wire Co NARAWIRE—Narragansett Wire Co NARAX—Narragansett Wire Co Narragansett Wire Co 1125 Main St Pawtucket Natale Machine & Tool Co 339 Highway #17 Carl-stadt NJ Natale Machine & Tool to 37 hymnostadt. M)
Natco Corp 327 Fifth Ave Pittsburgh 22 Pa
NATIONAL—General Hardware Mfg Co Inc.
National Acme Co Electrical Controls Div 170 E
131 St Cleveland 8 Ohio
National Appliance Co—see Ventrola Mfg Co
National Band & Tag Co 721 York St Newport Ky
National Carbon Co 30 E 42 St New York 17 NY
National Carbon Co 731 F 34 St New York 16 NY
National Decalcomania Corp 56 & Chestnut Sts
Phila 39 Pa
National Electric Coil Div McGraw-Edison Co 800
King Ave Columbus 16 Ohio
National Electric Controller Co 7070 Glenwood Ave
Chicago 26 III
National Electric Div H K Porter Co Inc Porter
Bldg Pittsburgh 19 Pa
National Electric Welding Machines Co 1846-1916
N Trumbull St Bay City Mich
National Engineering & Mfg Co 16th & Lamine Sts
Sedalia Mo
National Engineering & Mfg Co 16th & Lamine Sts
Sedalia Mo
National Fireproofing Corp—see Nation Corp Sedalia Mo National Fireproofing Corp—see Natco Corp National Jerrold Systems Inc—see Jerrold Electronics Corp National Lead Co 111 Broadway NY 6 NY
National Poultry Band Co—see National Band & Tag Co National Price Service—see Henderson-Hazel Corp NATIONAL RHEOSTAT—National Electric Controller Co National Specialties Co Inc 1902 Howell St Ft Wayne 7 Ind National-Standard Co 601 N 8th St Niles Mich National Super Service Co 1946 N 13 St Toledo Ohio National Super Service Co 1946 N 13 St Toledo Ohio National Supply Co—see National Supply Div Armco Steel Corp Two Gateway Center (P 0 Box 416) Pittsburgh 30 Pa National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich 11 me & Signal Corp—see National Time & Signal Corp—National Time & Signal Corp—National Time & Signal Corp—National Varnished Products Corp—see Natvar Corp Nat National Time & Signal Corp—National Varnished Products Corp—see Natvar Corp Natvar Corp 211 Randolph Ave Woodbridge NJ NAUTILUS—Linemaster Switch Corp—Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY NC-0-LITE—Speedex Mfg Co NECTOBOND—National Electric Div H K Porter Co NEATPAK—Federated Metals Div American Smelting & Refning Co NECCOBOND—National Electric Coil Div NELEX—Nelson Electric (Mfg Co Nelson Electric Co 210 Second Ave Seattle 4 Wash NEMCRAFT—Nemoc Electric Co NEO-TIME—Square D Co Electric Controller & Mfg Div NEO-SOL—Anabourn Migbor Co NEO-TIME—Square D Co Electric Controller & Mfg Div NEOCORK—Auburn Mfg Co NEOFIL—Bishoo Mfd Corp Price Service—see Henderson-Hazel Corp
RHEOSTAT—National Electric Controller NEO-SOL—Charleston Rubber Co
NEO-TIME—Square D Co Electric Controller & Mfg
Div
NEOCORK—Auburn Mfg Co
NEOFIL—Bishop Mfg Corp
NEOLAY—Kaiser Aluminum & Chemical Sales Inc
NEOLINE—Anaconda Wire & Cable Co
NEOSIGN—Anaconda Wire & Cable Co
NEOSIGN—Anaconda Wire & Cable Co
NEOTEX—Woodhead (Daniel) Co
NEOTEX—Woodhead (Daniel) Co
NEOTROL—Square D Co Electric Controller & Mfg
Div
NEOTEX—Square D Co Electric Controller & Mfg
Div
NEPCO—National Electric Div H K Porter Co
NEPCO-LOK—National Electric Div H K Porter Co
NEPCODUCT—National Electric Div H K Porter Co
NEPCONOL—National Electric Div H K Porter Co
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NEPCONOL — National Electric Div H K Porter Co
NEPCONOL — National Electric Div H K Porter Co
NEPCONOL — National Electric Div H K Porter Co
NED — National — Network Industries Inc P O Box 397 Bayonne NJ
NSUTRO—Dunton (M W) Co
NEVA GLARE—Marlou Lights Inc
NEVER CLOG—Pullman Vacuum Cleaner Corp
NEVER-CREEP—Chance (A B) Co
NEVER-SLIP—Miller Equipment Co Inc
New England Carbide Tool Co Inc 55 Commercial St
Medford 55 Mass
New England Electrical Works Inc 365 Main St
Lisbon NH
New Hampshire Ball Bearings Inc Route 202 Peterborough NH
New Jersey Fire Alarm Co—see Newark District Telegraph Co
New Jersey For Co Inc 350 Leland Ave Plainfield
NJ
Devolution Comments of the New Plainfield
NJ
Devolution Comments of New Plainfi New NJ NJ Jersey Porcelain Co Inc Plum St & NY Ave (P O Box 908) Trenton 5 NJ New Jersey Zinc Co 160 Front St New York 38 NY New York Fluorescent Mfg Co Inc 162 Bowery New York 12 NY NEW YORKER—Sun-Lite Mfg Co Newage Industries Inc 222 York Rd Jenkintown 41 Pa Newage International Inc—see Newage Industries Inc Newark District Telegraph Co 372 Plane St Newark 2 NJ 2 NJ
Newcomb Audio Products Co 6824 Lexington Ave
Hollywood 38 Calif
Newman Electric Motors Inc 357 Wilson Ave Newark
5 NJ

Niagara Transformer Corp 1751 Dale Rd Buffalo 25 NY NIAGRITE—Johns-Manville Nicad Div Gould-National Batteries Inc Easthampton Niagara Transformer Corp 1751 Date MB Burnaio 25 NY NIAGRITE—Johns-Manville Nicad Div Gould-National Batteries Inc Easthampton Mass Nichols Wire & Aluminum Co 1725 Rockingham Rd Davenport Iowa Nickel Cadmium Battery Corp—see Nicad Div NICRO—Fresh'nd-Aire Div Cory Corp Nickola Cadmium Battery Corp—see Nicad Div NICRO—Fresh'nd-Aire Div Cory Corp NIGHTINGALE—Adjustable Fixture Co Nickoh Tube Co 5000 S Whipple St Chicago 32 III NILSTAIN—Driver (Wilbur B) Co 9000 ARC—Mid-States Welder Mfg Co 99999 Filhe—American Silver Co Inc NITE—BEAM—Eagle Electric Mfg Co Inc NITE—BEAM—Eagle Electric Mfg Co Inc NITE—HAWK—Ray-0-Vac Co NITE—Offman Engineering Corp NITEAIR—Lau Blower Co NITELIGHTER—Fisher-Pierce Co NITELIGHTER—Fisher-Pierce Co NO-SHOK—Bell Electric Co NO-SHOK—Bell Electric Co NO-SHOK—Co-operative Utilities Co Inc NOBATRON—Sorensen & Co NOBLELOY—Continental-Wirt Electronics Corp NOBRUSH—Georator Corp NOBRUSH—Georator Corp NOBRESAL—Johns-Mamville NoEML—Rite-0-Lite Co NOKORODE—Dunton (M W) Co NOKORODE—Dunton (M W) Co NOROBLO—Dunton (M W) Co NOROBLO—Northern Blower Div Norder Corp Sor (See 1960) Confined to Mill Nork—General Hardware Mfg Co Inc Nork—General Hardware Mfg Co Inc Nork (Comp Comp Con 1960) Confined Mills (Comp 20 0 Mills (Comp Con 1960) Confined Mills (Comp 20 0 Mills (Comp Con 1960) Confined Mills (Comp 20 0 Mills (Comp 20 NORBLO—Northern Blower Div
Nordberg Mfg Co 3073 S Chase Ave Milwaukee 1
Wis
NORK—General Hardware Mfg Co Inc
Norky Mfg Corp P 0 Box 669 Covington Ky
NORLICO—Northern Light Co
NORMAN ELECTRIC CO—Star-A-Electric Mfg Co Inc
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY
NORPAK—Square D Co
NORSOLV—Northwoods Mfg Chemists Inc
North American Electric Lamp Co 1520 North 13th
St St Louis 6 Mo
NORTH-LITE—Great Northern Mfg Corp
North Shore Nameplate Inc—see North Shore Nameplate Div Anodyne Inc
North Shore Nameplate Div Anodyne Inc 1270 N W
165 St North Miami Beach Fla
Northbrook Products Inc Industrial Div 624 S
Michigan Ave Chicago 5 III
Northern Blower Co—see Northern Blower Div
Northern Blower Div Buell Engineering Co
Barberton Ave Cleveland 2 Ohio
Northern Light Co 1661 N Water St Milwaukee 2
Wish
Northern Light Co 1661 N Water St Milwaukee 2
Wish Northern Light Co 1661 N Water St milwauree 2 Wis Wis Wis 100 Northwestern Electric Co 1750 N Springfield Ave Chicago 47 Imerson Electric Mfg Co NORTHWIND—Emerson Electric Mfg Co NORTHWIND—Emerson Electric Mfg Co NORTHWIND—Emerson Silver Co Ewingville Rd (P 0 Box 455) Trenton 3 NJ Novelty Lighting Corp—see N L Corp NOVOID—G & W Electric Specialty Co NU-BLAC—Star Porcelain Co NU-BLAC—E—American Silver Co Inc NU-HXP—Marshall (John) Associates Inc NUJARC—Electric Arc Inc NUJARC—Electric Arc Inc Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio NUARC—Electric Arc Inc
Nutone Inc Madison & Red Bank Roads Cincinnati
27 Ohio
Nutting Truck and Caster Co 1201 W Division St
Fairbault Minn
Nye Tool Co 4120-30 Fullerton Ave Chicago 32 III
NYLAFLOW—Polymer Corp
NYLASINT—Polymer Corp
NYLASINT—Polymer Corp
NYLAWELD—Polymer Corp
NYLAWELD—Polymer Corp
NYLAWELD—Polymer Corp
NYLCLAD—Belden Mfg Co
NYLEZE—Phelps Dodge Copper Products Corp
NYLOX—Hardman (H V) Co Inc
NYLTEXENAMEL—Belden Mfg Co
NYTROL—Walker Brothers

OCULITE—Burton Mfg Co
ODOR-MASTER—Edco International Corp
ODOROUT—Westinghouse Electric Corp Lamp Div
Ohio Brass Co 380 N Main St Mansfield Ohio
Ohio Carbon Co 12508 Berea Rd Cleveland 11 Ohio
OHIOHM—Ohio Carbon Co
OHM-SPUN—States Co
Ohmite Mfg Co 3601 Howard St Skokie III
OHMOID—Willmington Fibre Specialty Co
OHMSTONE—Johns-Manville
OILFILTER—Controls Co of America
OILITE—Amplex Div Chrysler Corp
OKCIP—Burndy Corp
OKCIP—Burndy Corp
OKOLENE—Okonite Co
OKOLITE—Okonite Co
OKOLITE—Okonite Co
OKOLITE—Okonite Co
OKOFENE—Okonite Co
OKOSEAL—Okonite Co
OKOSEAL—Okonite Co
OKOYAR—Okonite Co Cannoga Tenn Mfg Co P O Box 217 Battle Creek Oliver Electrical Mfg Co P O Box 217 Battle Creek Mich Oliver Iron & Steel Corp—see Oliver Electrical Mfg Co OLYMPIC—Lint (Ciyde W) OLYMPIC—Lint (Ciyde W) OLYMPIC—Lint (Ciyde W) OLYMPIC—Sun-Lite Mfg Co Olympic Instruments Inc Vashon Omark Industries Inc 9701 S E McLoughlin Bivd Portland 22 Ore OMEGA—Wakefield Lighting Products Inc OMMI-GLOW—Industrial Devices Inc Onan Div Studebaker-Packard Corp Ave S E Minneapolis 14 Minn Onan (D W) & Sons Inc—see Onan Div Studebaker-Packard Corp ONE-COTE—Eagle-Picher Co ONE-PIECE—Buchanan Electrical Products Corp ONE SHOT—Hein-Werner Corp ONE SHOT—Lightolier Inc OPTOMATIC—Tico Psee Di-Acro Corp ONEL—Ectric So 43 Walker St. New York 13 NY OPALITE—Lightolier Inc OPTIPLEX—Lightolier Inc OPTOMATIC—Tico Fuse Mfg Co Orangeville Mfg Co Orange Overly-Hautz Co 11500 Madison Ave Cleveland 2 Ohio Oviatt (D C) Co 2174 Lakeside Ave Cleveland 14 Oh Ohio
Owatonna Tool Co 178 N Cedar St Owatonna Minn
Owens Illinois Glass Co—see Kimble Glass Co
Oxford Electric Corp Hudson Lamp Dix—see Hudson
Lamp Co
OXOFF—Anaconda Wire & Cable Co
OXOFF—Anacondo Wire & Cable Co
OXOIT—A

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PAD Inc—see Producers & Distributors Inc
P-A-X—Automatic Electric Co
P & C Hand Forged Tool Co—see P & C Tool Co
P & C Tool Co Box 5926 Milwaukee P 0 Portland 22 Ore
P-C Tool Co Box 5926 Milwaukee P 0 Portland 22 Ore
P-D-X—Phelps Dodge Copper Products Corp
PIC—General Controls Co
PIC—General Controls Co
PIV—Link-Belt Co
P & K—Pfaff & Kendall
PLM Products Inc 3871 W 150 St Cleveland 11
Ohio
PNR—Rockbestos Wire & Cable Co
P & P—Potter & Brumfield Div
PQ—Pekcu Co
PR—Plymouth Rubber Co Inc
P & R—Potter & Rayfield Inc
P & S—Pass & Seymour Inc
PTC—Precision Transformer Corp
PUC—Royal Electric Corp
PV DUIT—Carlon Products Corp
P-W Industries Inc 11200 Roosevelt Bivd Philadelphia 15 Pa
P & W Co—see Partrick & Wilkins Co
PWC—Plastic Wire & Cable Corp
PA&EMAKER—Hubbell (Harvey) Inc

P

PACEMAKER—Lightolier Inc PACEMAKER—Wakefield Lighting Dlv Pacific Electric Mfg Co—see Federal Pacific Electric Pacific Electric may coCo
Co
PACKAGE-AIRE—United States Air Conditioning Corp
Page Steel & Wire Div American Chain & Cable Co
Inc. P 0 Box 692 Monessen Pa
PAGESAVER—Auth Electric Co Inc
Paine Co 6 Westgate Rd Addison III
PAK-II—American Pulley Co
Palco Mfg Co 1260 Pennsylvania Ave San Francisco
7 Calif PAR-11—americal Palco Mfg Co 1260 Pennsylvania Ave San Francisco 7 Calif Paley Mfg Corp—see Circle Air Industries Inc Palmer Electric & Mfg Co 24 Water St Wakefield Palme. Mass PAN-L-HEAT-Jensen Inc PA.J.L-HEAT.—Jensen Inc
PANALARM—Panellit Div ISI Inc
PANASTAT.—Panellit Div ISI Inc
PANCAKE.—Wiremold Co
PANEL.-CHANEL.—Stahlin Bros Inc
PANEL-LUMINOUS—Luminous Ceilings Inc
PANELALE.—Lighting Products Inc
Panellit Div ISI Inc 7401 N Hamlin Ave Skokie III
Panellit Inc —see Panellit Div ISI Inc
PANELSCOPE —Waterman Products Co Inc
PANELSCOPE —Waterman Products Inc
PANELSCOPE —Waterman Products Inc
Panelyte Div St Regis Paper Co Enterprise Ave
Trenton NJ
PANG —Automatic Vulcanizers Corp
PANTRO—Control Panel Corp
PAR-BEAM-LITE —Swire ie Co Inc
PAR-HEAT —Essex Wire Corp
PARACORE —Kaiser Aluminum & Chemical Sales Inc
PARACORE —Holophame Co Inc
PARAFLO — Day-Brite Lighting Inc
PARAFLO — Day-Brite Lighting Inc
PARAFLO — Day-Brite Lighting Inc
PARAGORE —Kaiser Aluminum Sc Inc
PARAFLO — Day-Brite Lighting Inc
PARAGORE — Kaiser Aluminum Sc Inc
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PARAGORE — Kaiser Aluminum Sc Inc
PARAFLO — Day-Brite Lighting Inc
PARAFLO — Day-Brite Lighting Inc
PARAGORE — Kaiser Sc Inc
PARAFLO — Day-Brite Lighting Inc
PARAFLO PARAGRID-TILE—Wilson (J A) Lighting & Display Inc
PARAGROOVE—Line Material Industries
PARAGROOVE—Line Material Industries
PARAMOUNT—Earl Electric Mfg Corp
Paramount Industries Inc G-10800 Ballanger Rd
Filnt 4 Mich
PARANITE—Essex Wire Corp
Parco Mfg Co—see Rogers Electric Laboratories
Park Metalware Co Inc—see Xcelite Inc
Park Nameplate Co Inc 34-10 Linden Place Flushing
INV PARK SQUARE—Litecraft Mfg Corp Parker Electrical Mfg Co 221 Washintgon St Oak-land 7 Callf PARMATIC—General Electric Co Apparatus Sales PARQUAY—Brown Co Parr Electric Co—see Parr Mfg Corp Parr Mfg Corp 44 Austin St Newark 2 NJ Partlow Corp 230 Campion Rd New Hartford NY Partick Carter & Wilkins Co—see Partrick & Wilkins Parr Mfg Corp 44 Austin St. Newark 2 NJ
Partlow Corp 230 Campion Rd New Harford NY
Partlow Corp 230 Campion Rd New Harford NY
Partlow Corp 230 Campion Rd New Harford NY
Partlow Carter & Wilkins Co—see Partlok & Wilkins
Co
Co
Partlok & Wilkins Co 51 N Seventh St. Phila 6 Pa
Pass & Seymour Inc
Pare Seymour Inc
Pare Not Corp
Pare Seymour Inc
Pare Not Corp
Pare Not Co

Pennsylvania Transformer Co—see Pennsylvania Transformer Div Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa PENOLENE—Penetone Co PENROSE—Northbrook Products Inc. PERECO—Pereny Equipment Co Inc. Pereny Equipment Co Inc. Tri-Village Sta Columbus 12 Ohio Pereny Equipment Co Inc. Tri-Village Sta Columbus 12 Ohio Pereny Equipment Co Compared States of the Columbus C Perkins Battery Co 214 Gorden Laine
PERMA-ALIGN—Cummins Portable Tool Div
PERMA-CODE—Brady (W H) Co
PERMA-CODE—Brady (W H) Co
Perma-Line Corp P O Box 525 Middleboro Ky
Permacel U S Highway 1 New Brusnisch NJ
Permacel-Lepage's Inc.—see Permacel
PERMACOTE—Westinghouse Electric Corp
PERMACOTE—Westinghouse Electric Corp
PERMACOTE—Westinghouse Electric Corp
PERMACOM—Columbia Wire & Supply Co
PERMALINE—Columbia Wire & Supply Co
PERMALINE—Columbia Wire & Supply Co
PERMALINE—Line Material Industries
Permanent Magnet Co Inc. 4437 Bragdon St Lawrence
26 Ind Permanent Magnet Co Inc. 4437 Bragdon St Lawrence 26 Ind PERMAPRENE—Hatfield Wire & Cable Div Con-tinental Copper & Steel Industries Inc. PERMASEAL—Guardian Mfg Co PERMI-CAL—Topflight Corp Peschel Electronics Inc. RFD #1 Patterson NY Peters Mfg Co. 162 Old Colony Ave. Wollaston 70 Mases Mass
PETITE—Westinghouse Electric Corp Lamp Div
PETRO-DURE—Phelps Dodge Copper Products Corp
Petter Diesel Engine Div Brush Aboe Inc 34-14 58th
St Woodside 77 NY
Plaff & Kendall 84 Foundry St Newark 5 NJ
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury
Mass Phalo Plastics Corp 530 Boston Turnpike Shrewsbury
Mass
PHALON—Phalo Plastics Corp
PHANO-CHARGER—General Electric Co
PHAROS—Perfecilte Co
PHASE-ISOLATED—Pennsylvania Transformer Div
PHASE-GUARD—Stradley Engineering Co
PHASE-GUARD—Stradley Engineering Co
PHASEGARD—Chronoflash Co
PHEOS Dodge Copper Products Corp 300 Park Ave
New York 22 NY
Phelps Fan Mfg 715 Thomas St Little Rock Ark
Phelps Mfg Co—see Phelps Fan Mfg Co
PHIL-TROL—Phillips Control Corp
Philadelphia Electrical & Mfg Co 1200-36 N 31 St
Phila 21 Pa
PHILITE—Ruby-Philite Corp
Phillips (Oscar) Co 9701 Reading Rd (Box 21)
Cincinnati 15 Ohio
Phillips Ontrol Corp 59 W Washington St Joliet III
Phillips Drill Co U S 12 Michigan City Ind
Phillips Ontrol Corp 59 W Mashington St Joliet III
Phillips Drill Co U S 12 Michigan City Ind
Phillips Mfg Co Inc 8200 Grand Ave Minneapolis 20
Minn
PHOFNIX—Commercialaire Corp of America Minn
PHOENIX—Commercialaire Corp of America
PHOENIX—Frigid Air
FHONETALARM—American District Telegraph Co FHONETALARM—American District Telegraph Co PHONOCALL—Faraday Inc PHOSON—United Wire & Supply Corp PHOSTUBE—All-State Welding Alloys Co Inc PHOTO-TROLLER—Westinghouse Electric Corp Photobell Co Inc 43 Vesey St New York 7 NY Photomation Inc 96 S Washington Ave Bergenfield Photobación Inc 96 Seysys x New York 7 NY
Photomation Inc 96 S Washington Ave Bergenfield
NJ
PHOTOSWITCH—Electronics Corp of America
PIC—General Controls Co
PICK-OFF—Topflight Corp
PICOMA—Pipe Coupling Mfrs Inc
Pieper-Lillard Div Jasper Blackburn Corp 1525 Woodson Rd St Louis 14 Mo
PIER—Peer Inc
Pierce Renewable Fuses Inc Box F Leicester NY
PIERCEWAY—Massey (A H) Inc
PIGMAY—Capewell Mfg Co
PIN-GRIP—Star Expansion
PINCOR—Pioneer Gen-E-Motor Co
Pines Engineering Co Inc 601 Walnut St Aurora III
PINSPOT—Versen (Kurt) Co
PIOLITES—Wilson (J A) Lighting & Display Inc
Pioneer Gen-E-Motor Co 5841 W Dickens Ave Chicago
39 III
Pipe Coupling Mfrs Inc P 0 Box 488 Martins Ferry Pioneer Gen-E-Motor Co 5841 W DICKens Ave Unicage 39 III
Pipe Coupling Mfrs Inc P O Box 488 Martins Ferry Ohio
PIPEMASTER—Erie Tool Works
Piqua Machine & Mfg Co 441 S College St Piqua Ohio
PIRAC—Electri-Cord Mfg Co Inc
PISTOL-GRIP—Anderson Electric Corp
Pitman Mfg Co Garner Ave & Duck Rd Grandview Mo
PITT—Thepitt Mfg Co
Pittsburgh 22 Pa
Pittsburgh 22 Pa
Pittsburgh 22 Pa
Pittsburgh Standard Conduit Co James St Verona Pa
PLANFAK—Automatic Control Co
PLANTE—Gould-National Batteries Inc
PLANTMAN FLOORMOBILE—Handling Devices Co Inc
PLASCEME—Chester Cable Corp
PLAST-O-PRENE—Snyder (M L) & Son Inc
Plastri-LEX—Auburn Mfg Co
PLASTI-LUVR—Luminous Ceilings Inc
PLASTI-LUVR—Luminous Ceilings Inc
PLASTI-LUVR—Luminous Ceilings Inc
PLASTIBOND—Pittsburgh Standard Conduit Co

PLASTIC METAL—Onan (A L) Co Inc Plastic Pioneers Inc.—see Mastercraft Plastics Co Inc Plastic Wire & Cable Corp E Main St Jewett City Plastic Wire & Cable Corp E Main St Jewett City Conn
PLASTICLINER—Duro-Test Corp
PLASTICIORD—Chester Cable Corp
PLASTICORD—Chester Cable Corp
PLASTICORD—Chester Cable Corp
PLASTICORE—Chester Cable Corp
PLASTILIFE—Sloane Mig Co
PLASTILIFE—Sloane Mig Co
PLASTILIFE—Sloane Mig Co
PLASTILIFE—Metalcraft Products Co Inc
PLASTITE—Whitney Blake Co
Plastoid Corp 42-61 24th St LIC 1 NY
PLASTOLIER—Metalcraft Products Co Inc
PLASTOLIER—Metalcraft Products Co Inc
PLASTOLIER—Metalcraft Products Co Inc
PLASTONE—Ponn (Wm) Fluorescent Light Mfg Co
PLEXILITER—Duro-Test Corp
PLEXILITER—Duro-Test Corp
PLEXILITER—Duro-Test Corp
PLEXILIME—Turber Bros Inc
PLIG-IN—National Electric Div H K Porter Co
PLUG-IN—National Electric Div H K Porter Co
PLUG-IN—Square D Co
PLUG-IN—Square D Co
PLUG-IN—Square D Co
PLUG-IN—Square Co
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PLUG-IN—Square Co
PLUG-IN—Square Co
PLUG-IN—Square Co
PLUG-IN—CAPS—Jordan Industries Inc
PLUGMOLD—Wiremold Co
PLUG-IN—Square Co
PLUG-IN—Chaps—Pymouth Rubber Co Inc
PLYMMZONE—Pymouth Rubber Co Inc
PLYMMZONE—Pymouth Rubber Co Inc
PLYMMCONE—Pymouth Rubber Co Inc
PNEUL-TOR—Mine Safety Appliances Co
PNEU-DRAULIC—Allis-Chaimers Mfg Co
POCKET-SIZE—Champion DeArment Tool Co
POCKETSCOPE—Waterman Products Co Inc
POLE-MASTER—Kien (Mathias) & Sons
POLE STAR—Pennsylvania Transformer Div
Poles Inc E 706 Sprague Ave Spokane 3 Wash
POLLICARB—Driver (Wilbur B) Co
Polis Mfg Co—see Bulledio Div Gregory Industries Inc
Polis Mfg Co—see Bu PLASTICLINER—Duro-Test Corp Pollak (Joseph) Corp B1-95 Freeport St Boston 22
Mass
Pollak Luminescent Corp 1105 W Lawrence Ave Chicago 40 III
POLY-PLATE—Brady (W H) Co
POLY-V—Raybestos-Manhattan Inc
POLYDVNE—General Electric Co Apparatus Sales Div
POLYFLEX—Walker Brothers
Polyken Sales Div Kendall Co 309 W Jackson Blvd
Chicago 6 III
Polymer Corp 2120 Fairmount Ave Reading Pa
Polymer Corp of Pa—see Polymer Corp
POLYPENCO—Polymer Corp
POCHEAIN Products Co 224 N Patterson St Carey
Ohio
Porcelain Products Inc—see Chance (A B) Co Ohio
Porcelain Products Inc—see Chance (A B) Co
PORT-A-PHONE—Feiler Engineering & Mfg Co
PORT-O-LARM—Kidde Ultrasonic & Detection Alarms PORT-0-LARM—Kidde Ultrasonic & Detection Alarms Div One Control of Porter-Cable Machine Co 700 Marcellus St Syracuse 4 NY
4 NY
6 Portland-Monson Slate Co 465 Congress St Portland
3 Me
PORTO—Hessel (W F) Co Inc
PORTO—MITE—Beaver Pipe Tools Inc
PORTO—SYSTEM—Hessel (W F) Co Inc
Portomag Inc 1521 E Nine Mile Detroit 20 Mich
POS-E-ELEX—Thomas & Betts Co
POS-E-KOM—Thomas & Betts Co
POSITECT—S & C Electric Co
POSITIVE SEAL—Allis-Chalmers Mfg Co
POSITIVE SEAL—Allis-Chalmers Mfg Co
POSITIVE SEAL—Allis-Chalmers Mfg Co
POSITIVE SEAL—Allis-Chalmers Mfg Co
POSITIVE SEAL—Allis Chalmers Mfg Co
POSITIVE SEAL—A POST Electronic Products 12 Lothrop St Beverly
IMass
POST-LITE—Great Northern Mfg Corp
POST-LITE—Orake Mfg Co
POSTOP—Holophane Co Inc
POTLOK—General Controls Co
Potter & Brumfield Div American Machine and
Foundry Co Princeton Ind
Potter & Brumfield Inc—see Potter & Brumfield Div
Potter & Rayfield Inc P O Box 1042 Atlanta Ga
POWR-BOILVE—Wachs (EH) Co
POWR-MATIC—Aero-Motive Mfg Co
POWR-MATIC—Aero-Motive Mfg Co
POWR-MATIC—Aero-Motive Mfg Co
POWR-SPADE—Stampings Inc
POWACALL—Edwards Co Inc
Powder Power Tool Co—see Dmark Industries Inc
POWDIRON—Bound Brook Bearing Corp of America
POWER CHAPSILE—Begue Electric Mfg Co
POWER CHAPSILE—Begue Electric Mfg Co
POWER CHAPSILE—Begue Electric Mfg Co
POWER CHAPSICE—Boyale Electric Co
POWER CHAPSICE—Boyale Electric Co
POWER CHAPSICE—Bus M Electric Co
POWER STREAK—American Electric Co
POWER STREAK—American Electric Cobie Co
POWER TAND—Mid-States Welder Mfg Co POWER STREAK—American Electric Gable
Power-Strut Div Van Huffel Products Inc
Warren Ohio
POWER-TRAN—Mid-States Welder Mfg Co
POWER VENT—Progress Mfg Co Inc
POWERBEL—Auth Electric Co Inc
POWERBEL—Auth Clectric Co Toc
POWERCON—Cornell-Dubilier Electric Corp

Powercraft Corp 2215 De Kalb St St Louis 4 Mo
POWERDUCT—Anaconda Wire & Cable Co
Powerdyne Inc 17150 Boones Ferry Rd Oswego Ore
POWEREL—Industrial Electrical Works
POWERLOID—Guardian Electric Mfg Co
POWERLUBE—Solar Light Mfg Co
POWERLOID—Electric Mfg Co
POWERMASTER—Lewis-Shepard Products Inc
POWERMASTER—Coxwall Tool Co Ltd
POWERMASTER—Coxwall Tool Co Ltd
POWERS-AMERICAN—McCabe-Powers Body Co
POWERS-AMERICAN—McCabe-Powers Body Co POWERS-AMERICAN—McCabe-Powers Body Co
POWERSHOP—DeWalt Inc
POWERSTAT—Mercoid Corp
POWERSTAT—Mercoid Corp
POWERSTAT—Superior Electric Co
POWERUPTER—Delta-Star Electric Div H K Porter
Co Inc
POWR-CORD—Royal Electric Corp
POWR-RAC—Winpower Mfg Co
POWR-PAK—Winpower Mfg Co
POWR-PAK—Winpower Mfg Co
POWR-RIB—Ohmite Mfg Co
Powrex Switch Co 36 Pleasant St
Watertown Mass
POXALLOY—Okun (A L.) Co Inc
PRAYER LIGHT—Aeroid Lights Corp
PRE-MARX—Premax Products Div Chisholm-Ryder Co
Inc PRECIPTRON-Westinghouse Electric Corp Sturtevant PRECIPTRON—Westinghouse Electric Corp Sturtevant Div PRECISION-CHARGE—Lincoln Electric Co Precision Thermometer & Instrument Co 1434 Brandy-wine St. Philadelphia 30 Pa Precision Transformer Corp 2483 Greenleaf Ave Elk Grove Village III Precision Welder Mfg Co 2483 Greenleaf Ave Elk Grove Village III PREENX—General Electric Co Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio Premax Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY Prepco Corp Edgerton Wis PRES-SURE—Buchanan Electrical Products Corp PRES-TO-HEAT —Triton Mfg Co Inc College Calif Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Calif PRESIENTIAL—Pittsburgh Reflector Co PRES-TO-HEAT—Triton Mfg Co Inc
Prescolite Mfg Corp 2229 Fourth St Berkeley 10
Caiif
PRESIDENTIAL—Pittsburgh Reflector Co
PRESILOK—Prescolite Mfg Corp
PRESS LITES—Sun-Lite Mfg Cor
PRESSUBE-LOCK—General Electric Co
PRESSUBE-LOCK—General Electric Co
PRESSUBE-LOCK—General Electric Co
PRESSUBE-LOCK—General Electric Mfg Corp
PRESSUBE-TITE—Metropolitan Electric Mfg Corp
PRESSUBE-TITE—Metropolitan Electric Mfg Corp
PRESTIGE—Project Fixture Mfg Corp
PREMITE—Gruber Bros Inc
PRIBRO—Price Bros Inc
PRIBRO—Price Bros Inc
PRIDEX—Price Bros Inc
PRIDEX—Price Bros Inc
PRIDEX—Price Bros Inc
PRINCE—Vokogawa Electric Works Inc
PRINCE—Prokogawa Electric Works Inc
PRINCE—Vokogawa Electric Works Inc
PRINCE—Soc Curtis Lighting Div
Principle Research & Development Corp
PRINCE—Soc Curtis Lighting Div
Pringle Electrica Mfg Co 1900-1912 N Sixth St
Philadelphia 22 Pa
PRISMALUX—Lightolier Inc
PROFINALUX—Lightolier Inc
PROFINALUX—Lightolier Inc
PROFILE—Lightolier Inc
PROGRAMONITOR—Counter & Control Corp
Progress Mfg Co Inc Castor Ave & Tulip St
Pa
Pa Pa
Project Fixture Mfg Corp 55 Ongley St Rockville
Centre NY
PROJECTORAMA—Century Lighting Inc
PROMATIC—General Control Co
PROPELLAIR—Robbins & Myers Inc
PROTECT-0-VANE—Minneapolis-Honeywell Regulator Co
Industrial Div
Protection Controls Inc 6000 N Legett Ave Chicago
46 III AGE III
PROTECTO-MASK—Mystik Adhesive Products Inc
PROTECTOGLO—Minneapolis-Honeywell Regulator Co
Industrial Div
PROTECTROL—Automatic Control Co
PROTEX—Woodhead (Daniel) Co
PROTEXTUB—Eagle Electric Mfg Co Inc
Proto Tool Co Box 3519 Terminal Annex Los Angeles
54 Calif
PRY-LITE—Emerson-Pryne Co
Pucel Enterprises Inc 3746 Kelley Ave Cleveland 14
Ohio Pucel Enterprises and Ohio
Ohio
PUL-LIFT—Yale & Towne Mfg Co
PULFLEX—Universal Metal Hose Co
PULFUZSWITCH—Adam (Frank) Electric Co
PULLA-WAY—Wright Hoist Div
PULLA-REEL—Narragansett Wire Co
Pullman Vacuum Cleaner Corp 25 Buick St
Mass Pullman Vacuum Cleaner Corp 25 Buick St Boston Mass
Mass
PULSECOPE—Waterman Products Co Inc
PULSOLITE—Electronic Control Corp
PUMPTROL—Square D Co
PUMCHY—Curtis Lighting Div Curtis-All Brite Lighting Inc PUR-AR-LITE—House-O-Lite Corp

Pure Carbon Co Inc 441 Hall Ave St Marys Pa
PUREBON—Pure Carbon Co Inc
PURBMET—Pure Carbon Co Inc
PURBMET—Pure Carbon Co Inc
PURBMA-DURE—Phelps Dodge Products Corp
PUSHBUTTON—White-Rodgers Co
PUSHMATIC—I-T-E Circuit Breaker Co BuilDog Electric Products Div
Pyle-National Co 1344 N Kostner Ave Chicago 51 III
PYLE-C-FLEX—Pyle-National Co
PYLE-TS-LINE—Pyle-National Co
PYLE-TS-LINE—Pyle-National Co
PYLE-TS-Pyle-National Co
PYLON-LITE—Revere Electric Mfg Co
PYR-O-VANE—Minneapolis-Honeywell
Industrial Div
PYRALITE—Gruber Bros Inc
PYRANOL—General Electric Co
PYRATHERM—Mercoid Corp
PYRATHERM—Mercoid Corp
PYREX—Corning Glass Works
PYRO—Pyrometer Instrument Co
PYROTEMP—Electronic Control Corp
PYROCAST—Pyrosi Inc
PYROCON—Illinois Testing Laboratories Inc
PYROCON—Illinois Testing Laboratories Inc
PYROCON—Illinois Testing Laboratories Inc
PYROCON—Illinois Testing Corp
PYROLITE—Berko Electric Mfg Corp
PYROULTE—Berko Electric Mfg Corp
PYROULTE—Berko Electric Mfg Corp
Pyrometer Instrument Co
Bergenfield NJ
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio

#### O

Q-BESTON—Auburn Mfg Co
QHT—General Electric Co Apparatus Sales
QHT—General Electric Co Apparatus Sales
QHTAP—Burndy Corp
QU—Square D Co
QUAD—Quadrangle Mfg Co
QUAD—Quadrangle Mfg Co
QUAD—Quadrangle Mfg Co
QUAD—Quadrangle Mfg Co
QUARER—LITE—Holen (Thos F) Metal Co
QUAKER—LITE—Lightolier Inc
QUAKER—LITE—Quere (M L) & Son Inc
QUAKER—Snyder (M L) & Son Inc
QUARER LITE—Quaker City Electric Mfg Co
Quarer City Electric Mfg Co
Quarer Products Corp 688 Somerset St (P O Box 628)
Plainfield NJ
Queen Gray Co—see Gray Instrument Co
Queen Products Co Inc Thirteenth & Rowan Sts
Louisville 3 Ky
QUELARC—Pyle-National Co
QUICK-BILT—Frick-Gallagher Mfg Co
Quick Charpe Div Little Giant Corp
QUELARC—Pyle-National Co
QUICK-BILT—Frick-Gallagher Mfg Co
QUICK-BILT—Melson Electric Mfg Co
QUICK-TROL—Nelson Electric Mfg Co Inc
QUICK-TROL—Nelson Electric Mfg Co Inc
QUICK-TROL—Nelson Electric Corp
QUICK-TROL—Nelson Electric Corp
QUICK-TROL—Leviton Mfg Co Inc
QUIET AC—Leviton Mfg Co Inc
QUIET-LIGHT—Metalcraft Products Co Inc
QUIET AC—Leviton Mfg Co Inc
QUIET AC—Leviton Mfg Co
QUIK-HEAT—Clements Mfg Co
QUIK-HEAT—Clements Mfg Co
QUIK-LIFT—Coffing Hoist Div Duff-Norton Co
QUIK-LIFT—Coffing Hoist Div Duff-Norton Co
QUIK-LIFT—Coffing Hoist Div Duff-Norton Co
QUIK-LIFT—Ha Instrument Co
QUIKT—Mells Mfg Corp
QUIKL-LIFT—Ha Instrument Co
QUIKT—Wells Mfg Co
QUIKT—Mells Mfg Corp
QUIKT—Barady W H) Co
QUIK-LOR—Eagle Electric Mfg Co
QUIKT—Mells Mfg Corp
QUIKT—Barady W H) Co
QUIKT—Barady W H) Co
QUIKT—Barady W H) Co
QUIKT—Barady Dohns-Manwille
QUINTERRA—Johns-Manwille

R

R-ASE—All-Steel Equipment Inc
R-B-M Controls Div Essex Wire Corp 131 Godfrey St
Logansport Ind
RCA—Radio Corp of America
RCA WHIRLPOOL—Whirlpool Corp
RCD—Rotary Concrete Drill Co
RE—Reuland Electric Co
R & IE Equipment Div—see I-T-E Circuit Breaker Co

R-K—Ruggles-Klingemann Mfg Co
R/M—Raybestos-Manhattan Inc
R & M—Robbins & Myers Inc
R & M Hunter—see Hunter Div
RS—River Smelting & Refining Co
R/S—Refriegrating Specialties Co
RSPIV—Link-Belt Co
R T & E Co—see R T & E Corp
R T & E Cop 1900 East North St
Waukesha Wis
Rab Electric Mfg Co Inc 605 E 132 St New York 54
NY Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY
RABOLITE—Rab Electric Mfg Co Inc
Racine Electric Products—see Howard Industries Inc
RACO—All-Steel Equipment Inc
RACO—All-Steel Equipment Inc
RACO—Railroad Accessories Corp
RAD-O-GLOW—Blue M Electric Co
RADARANGE—Raytheon Mfg Co
RADCOR—Wiegand (Edwin L) Co
RADCOR—Wiegand (Edwin L) Co
RADCOR—Jurdan Electronics
RADCLIN—United States Radium Corp
RADI-AIRE—Reynolds Electric Co
RADIANTGLASS—Allied Precision Industries
RADIASTAT—Ward Leonard Electric Co
Radio Corp of America Industrial Electronics Products
Front & Cooper Sts Camden 2 NJ
Radio Frequency Laboratories Inc Boonton NJ
Radio Receptor Co Inc 240 Wythe Ave Brooklyn 11 NY
RADIOCARB—Driver (Wilbur B) Co
RADIOCARB—Driver Co 411 S Sangamon St Chicago 7 III
RADIX—Versen (Kurt) Co
Radix Wire Co 26260 Lakeland Blwd Cleveland 32
Obio RADIX—Versen (Kurt) Co
Radix Wire Co 26260 Lakeland Blvd Cleveland 32
Ohio
RADOR—Atlas Overhead Door Co
Rae Motor Corp Box 518 McHenry III
Railroad Accessories Corp Tenakili Park Cresskill NJ
RAKIT—Cope (T J) Div Rome Cable Corp
RAKSCOPE—Waterman Products Co Inc
Raico Mfg Co 123-141 N Albany Ave Chicago 12
III
Dammod Evaparion Rolf Co Ive RAM—Diamond Expansion Bolt Co Inc RAMAC—Rattan Mfg Co Rambusch Decorating Co 40 W 13 St New York 11 NY NY
Ramco Mfg Co 540 Westfield Ave W Roselle Park NJ
Ramco Mfg & Engineering 5413 N E Columbia Blvd
Portland Ore
Ramset Div—see Ramset Fastening System
Ramset Fastening System Winchester-Western Div Olin
Mathieson Chemical Corp 2B9 Winchester Ave New
Haven 4 Conn
Ramset Fasteners Inc—see Ramset Fastening System
RANCH-AIRE—Cool-ette Inc
RANCH-WINT—Cool-ette Inc
RANCH-WINT—Cool-ette Inc
RANCH-Western Insulated Wire Co
RANCHO—Western Insulated Wire Co
RANCHO—Western Insulated Wire Co
RANCHO—Western Insulated Wire Co
RANCHO—Service Minimum Company Report Con
RANCHO—Service Minimum Company Report Con
RANCE LUGS—Frankel Connector Co
RANCE LUGS—Frankel Connector Co
RANCER—Day-Brite Lighting Inc Lima Ohio
RANGE LUGS—Frankel Connector Co
RANGER—Day-Brite Lighting Inc
RANGESPLICES—Frankel Connector Co
RANGESPLICES—Frankel Connector Co
RANGESPLUCES—Frankel Connector Co
RANGETAP—Frankel Connector Co
RAPAC—Square D Co
Rapid Electric Co Inc 2881 Middletown Rd Bronx 61
NY
Rapid Electroplating Process Inc 1414 S Wabash Ave
Chicago 5 III
RATOLARM—Fischer & Porter Co
RATTAN—Benjamin Electric Mfg Co
Rattan Mfg Co 10 Wall St (P 0 Box 1745) New
Haven 7 Conn
Rattray (George) & Co Inc 101 New South Rd Hicksville NY
Rauland-Borg Corp 3535 West Addison St Chicago 18
III
RAWL—Rawiplug Co Inc
RAWLDRILL—Rawiplug Co Inc
RAWLDRIVE—Rawiplug Co Inc
RAWLORIVE—Rawiplug Co Inc Rawiplug Co Inc 212 Petersville Rd New Rochelle NY
RAY-HEAT—Tennessee Plastics Inc
RAY-LINE—Portable Light Co Inc
RAY-LINE—Sireno Signal Mfg Co
RAY MAN—Raybestos-Manhattan Inc
RAY-O-CELL—Com-Pak-Ett Mfg Corp
Ray-O-Vac Co 212 E Washington Ave Madison 10
Wis
RAY-VEC—Electrend Products Corp
Raybestos-Manhattan Inc 61 Willett St Passaic NJ
Raydyne Corp 2715 S Fourth St (P O Box 1147)
Springfield III
RAYESCENT—Westinghouse Electric Corp
Raytheon Mfg Co Commercial Apparatus & Systems
Div 100 River St Waltham 54 Mass
Div 100 River St Waltham 54 Mass
Div 100 River St Waltham 54 Mass
Div 100 River St Waltham 54 Co Inc
RAYWALL—Tennessee Plastics Inc
RE-CIRK-IT—Heineman Electric Co
RE LUX—Versen (Kurt) Co
REACTODYNE—U S Electrical Motors Inc
REACTONNE—U S Electrical Motors Inc
REACTON Lonin & Block Corp—see Reading Crane &
Hoist Corp
Reading Crane & Hoist Corp 2100 Adams St Reading
Pa Pa READY HEAT—Cox and Co Inc Ready-Power Co 11231 Freud Ave REALITE—Holophane Co inc REALITE—Holophane Co inc REAM-RITE—Holophane Co inc REAL—Versen (Kurt) Co RECAL—Versen (Kurt) Co RECAL—Versen (Kurt) Co RECO—Reynolds Electric Co RECO—Reynolds Electric Co RECOT a Co inc Powis Rd (Box 68) St Charles III RECTIT-FILTER—Raytheon Mfg Co RECTITCHARGER—Raytheon Mfg Co

RECTODYNE—Christie Electric Corp
RECTOPOWER—Mallory (P R) & Co Inc
RECTOX—Westinghouse Electric Corp
RED ARROW—Lift Trucks Inc
RED BAND—Howell Electric Motors Co
RED CENTER—Kein (Mathias) & Sons
RED "D"—Diamond Wire & Cable Co
RED-D-HEAT—Diamond Wire & Cable Corp
RED-D-PRNE—Diamond Wire & Cable Co
RED DOT—Mason (L E) Co
RED RED—Simonds Saw and Steel Co
RED BAND—Simonds Saw and Steel Co
RED GIANT—Revolvator Co
RED HEAD—Phillips Drill Co
RED-LUX—Duro-Test Corp
Red Seal Electric Co 10307 Detroit Ave Cleveland 2
Ohio Ohio Ohio Ohio Div RED SPOT—Wakefield Lighting Div RED TANG—Simonds Saw and Steel Co RED TOP—Bradley Semiconductor Corp RED TOP—H B Instrument Co RED-TOP—Helwig Carbon Products Inc Redi-Bolt Inc 5334 Indianapolis Blvd East Chicago Ind
REDI-FAB—Barber-Greene Co
REDI-FLOW—Barber-Greene Co
REDI-HEAT—Knapp-Monarch Co
REDI-KRPRES—Stahlin Bros Inc
REDI-MERS—Stahlin Bros Inc
REDMOND—Cyclo-Freez Corp
Redmond Co Inc 201 Monroe St Owosso Mich
REDOME—Versen (Kurt) Co
REDTOP—Bradley Semiconductor Corp
Reed Unit-Fans Inc 501 N St Patrick St New Orleans
La La
REEL-O-MATIC—Columbia Products Inc
REELIFT—Hykon Mfg Co
REELITE—Appleton Electric Co
REELITE—Appleton Electric Co
REES (Mackworth G) Inc 1573 E Forest Ave Detroit
7 Mich RECLITE—Appleton Electric LO
Res (Mackworth G) Inc 1573 E Forest Ave Detroit
7 Mich
Reve Electrical Co Inc 120 W 42nd St New York 36
NV
Reve Electronics Inc 609 W Lake St Chicago 6 III
REEVELEC—Reeve Electronics Inc
Reeves Pulley CO—see Reeves Pulley Div Reliance
Electric & Engineering Co
Reeves Pulley Div Reliance Electric & Engineering Co
1225 7th St Columbus Ind
REFLEX—Versen (Kurt) Co
REFRACTOLENS—Hollophane Co Inc
Refrigerating Specialities Co 3004 W Lexington St
Chicago 12 III
REGAL-LITE—Sterner Industries
REGATRON—Electric Measurements Co Inc
REGENT—Reystone Electric Mfg Co
REGONM—Electric Regulator Corp
REGULEX—Allis-Chalmers Mfg Co
REGULTE—Ward Leonard Electric Co
REGULTE—Ward Leonard Electric Co
REGULTE—Ward Leonard Electric Co
REGULTE—Ward Leonard Electric Co
REGULTE—Peters Mfg Co
RELAMPALITE—Prescolite Mfg Corp
RELAMP—Goldak Co Inc
RELAMPALITE—Prescolite Mfg Corp
RELAMP—Loddak Co Inc
RELECTO—Appleton Electric Co
RELISS—Versen (Kurt) Co
RELIANCE—Trine Mfg Corp
RELAMP—Standard Electric Co Inc
RELIANCE—American Steel & Wire Div
RELIANCE—Trine Mfg Corp
RELAMP—Goldak Co Inc
Reliance Electric & Engineering Co 24701 Euclid Ave
Cleveland 17 Onto
Reliance Electric & Engineering Co 24701 Euclid Ave
Cleveland 17 Onto
Reliance Electric & Engineering Co 24701 Euclid Ave
Cleveland 17 Onto
Reliance Electric & Engineering Co 24701 Euclid Ave
Cleveland 17 Onto
Remornat Lamp Corp 4500 W Division St Chicago
51 III
REMCON—Amprobe Instrument Corp
Remington Arms Co Inc 939 Barnum Ave Bridgeport 2 Conn
REMOTROL—Midwest Electric Products Inc
REMOTROL—Midwest Electric Products Inc
REMOTROL—Midwest Electric Products Inc
REMOTROL—Midwest Electric Products Inc
REMOTROL—Midwest Electric Specialty Co
RESISTOL—Olive Insulated Wire Co
REPAN—Versen (Kurt) Co
REPAN—Versen (Kurt) Co
REPAN—Versen (Kurt) Co
RESPOT—Versen Reeve Electrical Co Inc 120 W 42nd St New York 36 Revere Copper & Brass Inc 230 Park Ave NY 17 NY Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 III
REVMASTER—Opad Electric Co
Revolvator Co 2000 86th St North Bergen New Jersey
REVOLVO—Frick-Gallagher Mfg Co
REVOLVO-RAY—Sireno Signal Mfg Co
REVOTROL—Acme Electric Corp
REVUE—Versen (Kurt) Co

REX—Air Controls Inc
REX—Chain Belt Co
REX—Code Corp
REX-AIRATE—Air Controls Inc
Rex Metal Craft Inc 1717 Gent St Indianapolis
2 Indi 2 Ind 2 Ind REX-TUBE—Flexonics Corp One Welder Co 1200 Milton St Benton Harbor MICH Rex Welder Sale Co—see Universal Electric Sales Corp REXSELEN—Knopp Inc Reynolds Electric Co 3000 River Rd River Grove III III
Reynolds Metals Co Richmond 18 Va
REZAK—Versen (Kurt) Co
Rheem Califone Corp 1020 N La Brea Ave Hollywood 36 Calif
Rhode Island Insulated Wire Co Inc 50 Burnham
Ave Cranston RI
Rhodes (M H) Inc 30 Bartholomew Ave Hartford
6 Conn Ave transton R1
R1
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn
RIBBON HEAT—Cox and Co Inc
Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Texas
Rich Lamp Mfg Co—see Stabrite Fluorescent Mfg Co
Richards (J R) Co P 0 Box 482 Carnegie Pa
Richards Mfg Co Ltd 152 Coit St Irvington NJ
Richards-Wilcox Mfg Co 150 Third St Aurora III
Richardson-Allen Corp 116-15 Fifteenth Ave College Point LI NY
RICHMOND—Miller Co
Ridge Tool Co 400 Clark St Elyria Ohio
RIDGID—Ridge Tool Co
Ribeter (Frank) Inc—see Carlton Products Co
RIMSET—Penn Controls Inc
RIMSET—Penn Controls Inc
RIMSET—Penn Controls Inc
RIMSET—Penn Controls Inc
Ringcdorf Carbon Corp Box 22 East McKeesport
R2 Fa
RIPFLEX—Hatheld Wire & Cable Div
Ripley Co Inc Factory St Middletown Conn
RISERTHERM—Mercold Corp
Rite-0-Lite Co 308 E Washington Blvd Los Angeles
Calif
RITEOHM—Ohmite Mfg Co
RITEWAY—Building Service Co
Rittenhouse Co Inc 68 East St Honeoye Falls New
Vork York
River Smelting & Refining Co 4195 Bradley Rd (P 0
Box 5755) Cleveland 1 Ohio
Riverside Mfg & Electrical Supply Co 10228 Michigan Ave Dearborn Mich
RO-TITE—Curtis Lighting Div
Robbins & Myers Inc 1345 Lagonda Ave Springfield
Ohio Ohio
Robbins & Myers Inc Fan Div—see Hunter Div
Roberson Inc 1539 E 103 St Seattle 55 Wash
Roberson (L N) Co—see Roberson Inc
ROBERTA—House-O-Lite Corp
ROBERTSHAW—Fulton Sylonon Div
Robertson & Ruth 460 W Lake St Elmhurst Illinois
Robertson Transformer Co Thornton Road Blue
Island Illi ISSAND III
ROBINTRONIC—Hewitt-Robins
ROBIOT—Miller Harris Instrument Co
ROBOT—Miller Harris Instrument Co
ROBOT—EVE—Heat Timer Corp
ROBOT-EVE—Heat Timer Corp
Total Total Corp
Dobot Industries Inc 7041 Orchard St Dearborn Robot Industries Inc 7041 Orchard St Dearborn Mich NoBOTROL—Reliance Time Controls Inc Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich Robotron Corp Rockbestos Products Corp—see Rockbestos Wire & Cable Co Rockbestos Products Corp—see Rockbestos Wire & Cable Co Rock Rocket Devices Corp—see Star Expansion ROCKING CONTACT—Allis-Chalmers Mig Co Rocket Devices Corp—see Star Expansion ROCKING CONTACT—Allis-Chalmers Mig Co Rocket Devices Corp—see Star Expansion ROCKING CONTACT—Allis-Chalmers Mig Co Rocket Devices Corp—see Star Expansion ROCKING CONTACT—Allis-Chalmers Mig Co Rocket Devices Corp—see Star Expansion ROCKING CONTACT—Allis-Chalmers Mig Co Rocket Devices Corp—Roebling's (John A) Sons Corp Roebling's (John A) Sons Corp ROECLAD—Roebling's (John A) Sons Corp ROECHAD—Roebling's (John A) Sons Corp ROEVAR—Roebling's (John A) Sons Corp ROEVAR—Roebli Mich ROBOTROL—Reliance Time Controls Inc Robotron Corp 21300 W Eight Mile Rd Detroit Ohio

NY
Roller (Wm G) Inc 159 Liberty Ave Mineola NY
Roller-Smith Corp—see Federal Pacific Electric Co
Roller-Smith Inc—see Federal Pacific Electric Co
ROLLEREEL—Suttle Equipment Co
ROLLO-COLOR—Luxor Lighting Products Inc
Rollway Bearing Co Inc 541 Seymour St Syracuse 4

ROLON—Rome Cable Div of Alcoa
ROMARINE—Rome Cable Div of Alcoa
ROMARINE—Rome Cable Div of Alcoa
Rome Cable Corp—see Rome Cable Div of Alcoa
Rome Cable Div of Alcoa
ROME RIGID—Rome Cable Div of Alcoa
ROMERIGID—Rome Cable Div of Alcoa
ROMERI—Rome Cable Div of Alcoa
ROSEAL—Rome Cable Div of Alcoa
ROSINX—Dunton (MW) Co
Ross Operating Valve Co 120 E Golden Gate Ave
Detroit 3 Mich
Rostan Corp 5660 59th St Maspeth 78 LI NY
ROTABIN—Frick-Gallagher Mfg Co
Rotary Concrete Drill Co 650 S Arroyo Parkway
Pasadena 1 Calif
Roth Controls Inc Box 900 Evanston III
Roth Controls Inc Box 900 Evanston III
Roth Controls Inc Ross 900 Evanston III
ROTO-BINDICATOR—Bin-Dicator Co
ROTO-BINDICATOR—Bin-Dicator Co
ROTO-GLO—Pass & Seymour Inc
ROTO-GRUP—Bin-Dicator Co
ROTO-GLO—Bas Seymour Inc
ROTO-GRUP—Bin-Dicator Co
ROTO-GLO—Haydon (A W) Co
ROTO STRIP—Neo-Ray Products Inc
ROTO TROL—Haylor (I gibting Co
ROTO TROL—Haylor (I gibting Co
ROTO TROL—Haylor (I gibting Co
ROTO DELOR—See Rep Rod Color Colo ROTOLECTOR—Kliegl Bros Universal Electric Stage
Lighting Co Inc
ROTOLENS-Steber Mfg Co
ROTOMOTIVE—Jack & Heintz Div Siegler Corp
ROTOSPOT—Rambusch Decorating Co
ROTOTROL—Westinghouse Electric Corp
ROTRYWIST—Star Expansion
Round (David) & Son Inc Box 9557 Cleveland 39
Ohio
ROUND WOUND—Line Material Logenting Round (David) & Son Inc Box 9557 Cleveland 39
Ohio
ROUND WOUND—Line Material Industries
ROU-A-LITE—Terado Co
ROYAL—Waveland Electric Cop
Royal Electric Cop 95 Grand Ave Pawtucket
ROYAL—Waveland Electric Cop
Royal Electric Cop 95 Grand Ave Pawtucket
ROYAL Electric Cop 95 Grand Ave Pawtucket
ROYAL NOARK—Royal Electric Cop
ROYALMARK—Royal Electric Cop
ROYALMAITC—Standard Electric Time Co
ROYALMAITC—Standard Electric Time Co
ROZONE—Rome Cable Div of Alcoa
RUBBER COAT—Wilbur Williams Co
RUBBER COBO—Pail-State Welding Alloys Co
Inc
RUBBER COBO—Pail-State Welding Alloys Co
RUBBRITE—Co-operative Utilities Co Inc
RUBRITE—Co-operative Utilities Co Inc
RUBRITE—Co-operative Utilities Co Inc
RUBRITE—Co-operative Utilities Co Inc
RUBRITE—Co-operative Utilities Co
RUBRITE—Co-operative Utilities Co
Inc
RUBRITE—Co-operative U Mass
RUNABOUT—Barber-Greene Co
RUPTAIR—Allis-Chalmers Mfg Co
RUPTOR—Allis-Chalmers Mfg Co
RUPTOR—Allis-Chalmers Mfg Co
RUR-A-LINE—Plastic Wire & Cable Corp
RUR-ALLM—General Cable Corp
RUSALAY—General Cable Corp
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38
Rush Wire Strippes Div France Co. Mich
Rush Wire Stripper Div Eraser Co Inc 1068 S Clinton St Syracuse 4 NY
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
RUSTOND—Corposition Co
RISTIGLITE—Gruber Bros Inc
Ryther Purdy Lumber Co Inc 501 Tiffany St New
York 59 NY

#### S

S & C Electric Co 4435 Ravenswood Ave Chicago 40 III

SCEO—Southern Carbon Brush Co Inc SCEO—Superior Carbon Products Co SCR DIMMER—Kliegl Bros Universal Electric Stage Lighting Co Inc SI—Southwestern Industrial Electronics Co SI—Southwestern Industrial Electronics Co SKF Industries Inc Front St & Erie Ave Phila 32 Pa SMC—St Marys Carbon Co SWFCO—Superior Porcelain Co SWFA—Swedish Iron & Steel Corp SVFA—Swedish Iron & Steel Corp SVFA—Swedish Iron & Steel Corp SVFA—Swedish Iron & Steel Corp SAFISE—Electric Machinery Mfg Co SABER-TOOTH—Rawiplug Co Inc SAFI-EX—Starrett (L S) Co SAF-KEV—Electric Distribution Products Inc SAFI-T-AIR—United Electric Motor Co SAFI-T-GRIP—Miller Co Superior Systems Div SAFISE—Superior Superior Systems Div SAFARI—Benjamin Electric Co Safa Alarm Div Inc—see Fyr-Fyter Co Systems Div SAFE-T-BEAM—Westinghouse Electric Corp Lamp Div SAFE-T-BEAM—Westinghouse Electric Corp Lamp Div SAFE-T-CLIP—Industrial Devices Inc

SAFE-T-GLOW—Brach Mfg Co
SAFE-T-K00L—Active Specialty Co
SAFE-T-K00L—Active Specialty Co
Safe-T-Milk Corp 2904 Chapman Oakland 1 Calif
SAFE-T-SEALS—Misener Mfg Co Inc
SAFE-T-TAP—Keystone Mfg Co
SAFECOTE—National Electric Div—H K Porter Co
SAFECOTE—Roebling's (John A) Sons Corp
SAFETECH—Capewell Mfg Co
Safety Belt-Lacer Co—see Armstrong-Bray & Co
Safety Car Heating Corp—see Safety Electrical Equipment Corp Safety Car Heating Corp—see Safety Electrical Equipment Corp
SAFETY-GLO—Rodale Mfg Co Inc
Safety Industries—see Safety Electrical Equipment Corp
Safety Live Line Tool Co 973 86th Ave Oakland
21 Calif
SAFETY MI—General Cable Corp
SAFETY PULL—Coffing Hoist Div
SAFETY PULL—Coffing Hoist Div
SAFETY YELLOW—Woodhead (Daniel) Co
SAFEWAY—American Pulley Co
SAFEWAY—Merican Pulley Co
SAFEWAY—Woodhead (Daniel) Co
SAFEX—Safety Live Line Tool Co
SAFEX—Wright Hoist Div
Safeway Steel Products Inc
SAFEX—Square D Co
SAFEX—Square D Co
SAFATEX—Square D Co
SAFATEX—Square D Co
SAFATEST—Fleron (M M) & Son
SAFAREN—Duro-Test Corp
SAFREN—Duro-Test Corp
SAFRON—Square D Co
SAFTEST—Fleron (M M) & Son
SAFWAY—ALDEK—Safway Steel Products Inc
St Louis Malteable Casting Co 7701 N Conduit Ave
St Louis Brass Co—see Guth (Edwin F) Co
St Marys Carbon Co
St State St St Marys Pa
Sair Corp 9802 Euclid Ave Cleveland 6 Ohio
Salem Tool Co 7767 S Elisworth Ave Salem Ohio
SALI—Addalet Mig Co
SAMSON—Metalcraft Products Co Inc
SAMSON—SootT—Holub Industries Inc
Sargent Electric Corp 630 Merrick Cd Lymbrobs
NY ment Corp
SAFETY-GLO—Rodale Mfg Co Inc
SAFETY Industries—see Safety Electrical Equipment Sargent Electric Corp 630 Merrick Rd Lymbrook NY
Sasgen Derrick Co 3101 Grand Ave Chicago III
SAT-0-LITE—House-0-Lite Corp
SATELLITE—Prescolite Mfg Corp
SATELLUME—Ainsworth Lighting Inc
SATI-LITE—Electric Service Systems Inc
Saure-isen Cements Co 1045 N Canal St Pittsburgh
15 Pa
Save Lamp Corp.—see Panalassy Corp. SAVGUA-Berning Social St. Pittsburgh
15 Pa
Save Lamp Corp—see Penetray Corp
SAW-GUN-Mid-States Welder Mfg Co
SAWAGUN-Mid-States Welder Mfg Co
SAXOND-Benjamin Electric Tool Corp
SAXOND-Benjamin Electric Mfg Co
Saxonburg Geramics Inc PO Box 157 Saxonburg Pa
Saylor Electric Products Corp 277 Pierce St Birmingham Mich
SAYLORDUCT—Saylor Electric Products Corp
Scaloc Controls Inc PO Box 41 Delanco NJ
SCALLOP-CEL—Meo-Ray Products Inc
SCAM Instrument Corp 3101 N Lowell Ave Chicago
41 III 41 III Scharff (JF) Inc—see Kidde Ultrasonic & Detection Scharft (Jr.)
Alarms Div
Schauer Machine Co—see Schauer Mfg Corp
Schauer Mfg Corp 4500 Alpine Ave Cincinnat! 42 Ohio
Schenectady Varnish Co Inc Congress & 9th Sts
Schenectady 1 NY
SCHOOLMASTER—Great Northern Mfg Corp
Schweitzer & Conrad Inc—see S & C Electric Co
Scialy Bros Inc 4915 W 67 St Chicago 38 III
Scientific Electric Inc 105-109 Monroe St Garfield Scientific Electric Inc 105-109 Monroe St Garfield NJ
SCINTAGUN—Goldak Co Inc
SCODT-LITE—Woodward Machine Co
SCOPE—Stromberg Div General Time Corp
SCOTCH—Minnesota Mining & Mfg Co
SCOTCHAST—Minnesota Mining & Mfg Co
SCOTCHKOTE—Minnesota Mining & Mfg Co
SCOTCHKOTE—Minnesota Mining & Mfg Co
SCOTCHKOTE—Minnesota Mining & Mfg Co
SCOTCHTITE—Minnesota Mining & Mfg Co
SCOTCHTITE
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Mining Mfg Co
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Minnesota Mining & Mfg Co
SCOTCHTITE
Mining Mfg Co
SCOTCHTITE
Minin Scranton Storage Battery Corp—see Cellomatic Batter Corp Scrayco Level Controls—see Scrayco Mfo Co Scrayco Mfo Co 201 Greene Ave Middlesex NJ SCRU-LTS—Solar Electric Corp SCRU-LTBADD—Rawlplup Co Inc SCRU-LTE—Mastercraft Plastics Co Inc SCRU-LTTE—Mastercraft Plastics Co Inc SCRU-LTTE—Myers Electric Products Inc Scrulos (Lloyd) Co—see Howard Industries Inc SCRUIN—TSLATE Expansion SCRUIN—TSLATE Expansion SCRUIN—TSLATE Expansion SCRUIN—TSLATE Expansion SCRUIN—TSLATE SCANSION SCANS SCRUIN—Star Expansion
SCRULUG—Burndy Corp
SCRULPTIRAMA—Sumbeam Lighting Co
SEA BREEZE—Emerson Electric Mfg Co
SEA FOAM—Tevco Insulated Wire
Seaboard Products Corp Electric Heating Div 191
Frelinghuysen Ave Newark NJ
Seager Standard Carbon Co 291 Church St New York
13 NY SEAL THRU-Eliza Metal Products Co SEALED TIGHT-Royal Electric Corp

SEALFLEX.—Universal Metal Hose Co
SEALNUT—Radio Frequency Laboratories Inc
SEALSTIX—Central Scientific Co
SEALTITE—Anaconda Metal Hose Div
SECONEC—Rusgreen Mig Co
SECURITY—United States Rubber Co
SECURITY—United States Rubber Co
Security Lightning Rod Co—see Security Mfg &
Contracting Co Security Lightning rook to be security wing a Contracting Co Security Ming & Contracting Co 606-612 Pine St Burlington Wis SECURITYFLEX—Anaconda Wire & Cable Co SEECO—Southern Electrical Equipment Co Seeger-Williams Inc 4 Norman St Bridgepart 5 Cona Seeger-Williams Inc 4 Norman St. Bridgepart 5
Cone
SEELBOLT—APM Corp
SEELRYIT—APM Corp
SEELLSKREW—APM Corp
SEELLY—Guth (Edwin F) Co
Seely Instrument Co Inc 377 Fourth St (P 0 Box
387) Niagara Falls NY
Segil (L. J) Co 2500 W North Ave Chicago 47 III
SELCO—Sell (H H) Electric Co
SELCO—Spies Electric Works
SELECT—ASPEDE—Allis (Louis) Co
SELECT—AMP—Moloney Electric Co
SELECT—CAMP—Moloney Electric Co
SELECT—Gundatic—Feier Engineering & Mfg Co
SELECTROL—Electro Dynamic Div General Dynamics
Corp Corp
SELECTRON—Electro Dynamic Div General Dynamics SELECTRON—Electro Dynamic of Corp
Corp
SELEKTA—Associated American Winding Machines Inc
SELENIBRAKE—American Rectifier Corp
SELENIDRIVE—American Rectifier Corp
SELENIPIER—American Rectifier Corp
SELENIFIER—American Rectifier Corp
SELENIFIER—Selectifier Corp
SELENIFIER—Selectifier Corp
SELENIFIER—American Rectifier Corp
SELENIFIER—American Rectifier Corp
SELF-CHECKING—Sensitive Research Instrument Corp
Self-Lifting Plano Truck Co 423 N Main St. Findlay
Ohio SELF-CHECKING—Sensitive Research Instrument Corp
Self-Lifting Piano Truck Co 423 N Main St Findlay
Ohio
SELFDRIL—Star Expansion
SELFUBE—Keystone Carbon Co Inc
SELFUBE—Keystone Carbon Co Inc
Sell (H h J Electric Co 3240 Dakota Ave Minneapolis 16 Minn
SELPO—Self-Lifting Piano Truck Co
SENIOR—Linemaster Switch Corp
Sensitive Research Instrument Corp 310 Main St
New Rochelle NY
SENTINEL—Ellenco Inc
SENTINEL—Portable Light Co Inc
SENTINEL—Portable Light Co Inc
SENTY-Lite—Cellomatic Battery Corp
Sentry-Lite—Eastery Div Hobby & Brown Electronic
Corp 237 Sunrise Highway Rockville Centre NY
SEPCO—Steel Electric Products Co Inc
SEPRABLE—Appleton Electric Co
SEQUENSTART—Sola Electric Div
Sequoia Process Corp—see Sequoia Wire & Cable
Sequoia Wire & Cable Co 2201 Bay Rd (P O Box
1007) Redwood City Calif
SERV-EN—Kearney (James R) Corp
SERVICE BUGS—Frankel Connector Co
SERVICE—MASTER—Micabe-Powers Body Co
SERVICE—MASTER—Micabe-Powers Body Co
SERVICE—MASTER—Micabe-Powers Body Co
SERVICESPOOL—Alpha Wire Corp
SERVISLEEV—Hubbard & Co
SERVITS—Burndy Corp
Servispeed Div Electric Div
SESAME—Alliance Mfg Co Inc
SETITE—US Expansion Bolt Co
Seton Name Plate Co Inc 50 Fitch St New Haven
15 Conn
Seyler Mfg Co—see Chance (AB) Co
SHAFTMOUNT—U S Electrical Motors Inc
Shalda Mfg Co Inc 156 W Providencia Ave
Burbank Calif
Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis Seyer ming co-see chance color of the color Sherman & Reilly Inc 1 Broad St Chattanooga 2
Tenn
Sherwin-Williams Co 101 Prospect Ave NW Cleve-Sherwin-Williams Co 101 Prospect Ave NW Cleve-land 1 Ohio
SHIELD-ARC—Lincoln Electric Co
SHIPMASTER—Lewis-Shepard Products Inc
SHOCK PROOF—Industrial Transformer Corp
Shock-Rite Electric Fence Co—see Electric Service Systems Inc SHOCK-STOPS—Connecticut Hard Rubber Co SHOCK-STOPS—Connecticut Hard Rubber (
SHOK-ASDORBER—Royal Electric Corp
SHOK-PRUF—Cable Electric Products Inc
SHOKLESS—Knesisty Electric Co
SHOP-CADDY—Allied Mfg & Sales Co
SHOP KING—Precision Welder Mfg Co
SHOPLIFER—Econ

SHOVELITE—Rambusch Decorating Co Shox-Stok Inc Wellington Ohio Shrader (FW) Co 11623 S Broadway Los Angeles 61 Calif Shox-Stok Inc. Wellington Ohio
Shrader (FW Co 11623 S Broadway Los Angeles
Shrader (FW Co 11623 S Broadway Los Angeles
Sh. Call
Shrader (FW Co 11623 S Broadway Los Angeles
Sh. Call
Shuford Mills Inc. P O Drawer 340 Hickory NC
SHUR-ROLD—Hays Mfg Co
SHUR-ROLD—Hays Mfg Co
SHUR-MOUNT—Swivelier Co Inc
SHURE MIVE—Ramset Fastening System
Shure Mfg Corp 1601 S Hanley Rd St. Louis Mo
SHURE SET—Ramset Fastening System
Shure Mfg Corp 1601 S Hanley Rd St. Louis Mo
SHURE SET—Ramset Fastening System
SHURFLO—Anchor Metal Co Inc
Shurite Meters 130 Wallace St. New Haven 8 Conn
SHURLOX—Pass & Seymour Inc
SHURLOX—Pass & Seymour Inc
SHURLOX—Pass & Seymour Inc
SHUT-O-VENT—Reed Unit-Fars Inc
SHUT-O-VENT—Reed Unit-Fars Inc
SHUT-BAK—Adam (Frank) Electric Co
SIANGES—Bradley Semiconductor Corp
SIANGR—Pucel Enterprises Inc
SIDALARM—Newark District Telegraph Co
SIDE-O-RAY—Ouray Fluorescent Mfg Co
Siebring Mfg Co George Iowa
SIECO—Sherman Industrial Electronics Div
Siegler Corp Magnetic Amplifiers Div 632 Tinton Ave
New York 55 NY
SIEMARC—Southwestern Industrial Electronics Co
SIERRA-BIPLEX—Sierra Electric Corp
SIERRA-SIERRA-Sierra Electric Corp
SIERRA-TEX—Sierra Electric Corp
SIERRA-TEX—Sier Signal Engineering & Mfg Co—see Wheelock Signals Inc
SIGNAL MAT—Patrick & Wilkins Co
SIGNAL MAT—Patrick & Wilkins Co
Signalite Inc Signalite Inc
Signalite Inc 37-41 Neptume Highway Neptume NJ
SIGNALMASTER—Goldak Co Inc
Signet Controls 2205 S E 13th Ave Portland 2 Ore
SIL-ATRAN—Mid-States Welder Mfg Co
SIL-BES—Electro-Technical Products Div
SIL BOND—United Wire & Supply Corp
SIL-IL-TRAN—Mid-States Welder Mfg Co
SIL FLUX—United Wire & Supply Corp
SIL-I-TRAN—Mid-States Welder Mfg Co
SIL-STIC—Dow Corning Corp
SIL-LATRIC—Dow Corning Corp
SILCAD—Yardney Electric Corp
SILCOBEST—Silicone Insulation Inc
SILCONIC—Gould-National Batteries Inc
SILENT—Leviton Mfg Co Inc
Silent Hoist & Crane Co 841 63rd St Brooklyn 20
NY
SILENT—KING—Cable Electric Products Inc
SILIC-O-NETIC—Heinemann Electric Co
Silicone Insulation Inc 1383 Seabury Ave Bronx 61
NY
SILICONIC—Willard Storage Battery Div
SILICONIC—Willard Storage Battery Div
SILICONIC—Willard Storage Battery Div
SILICONIC—Willard Storage Battery Div
SILICONIC—Willard Storage Battery Div SIIIcone Insulation Inc 1383 Seabury Ave Bronx 61
NY
SILCONIC—Willard Storage Battery Div
SILOTEX—Anaconda Wire & Cable Co
SILTUBE—All-State Welding Alloys Co Inc
SILV-A-FLEX—Plastic Wire & Cable Corp
SILVER BEAUTY—Triple-A Specialty Co
SILVER DOT—Silway Lighting Inc
SILVER KING—General Control Co
SILVER KING—General Control Co
SILVER LABEL—Dunton (MW) Co
SILVER LABEL—Dunton (MW) Co
SILVER SPOT—Silvay Lighting Inc
SILVERCEL—Yardney Electric Corp
SILVERFLEX—Electra Insulation Corp
SILVERFLEX—Electra Insulation Corp
SILVERLINE—Thor Power Tool Co
SILVERSICK—Republic Steel Corp
SILVERLINE—Westinghouse Electric Corp
SILVERSICK—Republic Steel Corp
Silvery Pipe Bender Co 2215 Brighton Ave Kansat
City 27 Mo
Silvray Lighting Inc 100 Main St. Bound Brook Mar City 27 Mo
Silvray Lighting Inc 100 Main St Bound Brook NJ
SIMCONEX—Simplex Wire & Cable Co
Simes Co Inc 114 15th Ave College Point LI NY
Simmonds Aerocessories Inc—see Simmonds Precision
Products Inc
Simmonds Precision Products Inc Tarrytown
Simonds Saw and Steel Co 470 Main St Fltchburg Simmonds Precision Products Inc Tarrytown NY
Simonds Saw and Steel Co 470 Main St Fitchburg
Mans
Mans
Saw and Steel Co 470 Main St Fitchburg
Mans
Simplex Co—see Lucifer Furnaces Inc
SIMPLEX—Templeton Kenly & Co
SIMPLEX—Weiss & Biheller Merchandise Corp
Simplex Co Inc 1139-41 N MacArthur Blvd
Springfield III
Simplex Time Recorder Co 24 S Lincoln St Gardner
Mass
Simplex Wire & Cable Co 79 Sidney St Cambridge
39 Mass
SIMPLYTROL—Assembly Products Inc
Simpson Co 1470 Doolittle Dr San Leandro Calif
Simpson Electric Co 5200 W Kinzie St Chicago 44
III 111
Simpson (Mark) Mfg Co Inc 32-28 49th St Long
Island City 3 NY
Simpson Screen Co—see Simpson Co
SIOUX—Albertson & Co Inc
SIRENO—Portable Light Co Inc SIRENU—Portable Light to Inc Sireno Co Inc—see Sireno Signal Mfg Co Sireno Signal Mfg Co 65 Passaic Ave Kearny NJ SISCO—Swedish Iron & Steel Corp Sittler Corp 18 N Ada St. Chicago 7 III 60th ANNIVERSARY—Garcy Lighting Div

SKANDIA—Eagle Mfg Co
SKEDDODLE—Reynolds Electric Co
Skil Corp 5033 Elston Ave Chicago 30 III
SKILDRILL—Shallcross Controls Inc
SKILSAW—Skil Gorp
SKILSAW—Skil Gorp
SKILSAW—Shallcross Controls Inc
Skilsaw Inc—see Skil Corp
Skinner Chuck Co—see Skinner Precision Industries Inc
Skinner Electric Valve Div
SKIP TOOTH—Nye Tool Co
SKVLLGARD—Mine Safety Appliances Co
SKY-BLAST—Robbins & Myers Inc
SKY-LUX—Curtis Lighting Div Gurtis-All Brite
SKY-LIDK—Allied Mfg & Sales Co
SKY-STREAK—American Electric Cable Co
SKY-LEMT—Buffalo Forge Co
SKY-LEMT—Buffalo Forge Co
SKY-LEMT—Buffalo Forge Co
SKY-LEMT—Buffalo Forge Co
SKY-LIRE—Automatic Transportation Co
SKYLINE—Arex Co
SKYLINE—Rectro Lighting Co
SKYLINE—Rectro Lighting Co
SKYLINE—Electro Lighting Co
SKYLIME—Electro Lighting Co
SKYSECTOR—Silvay Lighting Inc
Skyuorker Corp—see United States
Air Conditioning Corp
Sloworker Div Emhart Mfg Co—see United States
Air Conditioning Corp
Slater Appliances Inc—see Slater Electric & Mfg Co
Inc
Slater Appliances Inc—see Slater Electric & Mfg Co
Slater Inc—Inc—see Slater Electric & Mfg Co
Slater Inc—Supriances Inc—see Slater Electric & Mfg Co
Slater Inc—Supriances Inc—see Slater Electric & Mfg Co
SLIMFLUX—Guth Ectriv Fr
Co
SLIMFLUX—Guth Ectriv Fr
Co
SLIMFLUX—Guth Ectriv Fr
Co
SLIMFLUX—Superior Electric Co
Sloworker Guther Fr
SLUGBIN—Star Expansion
SLUMBER GLO—Rodale Mfg Co Inc
SLUMBER GLO—Rodale Mfg Co Inc SLO-SYN—Superior Electric Co
Sloane Mfg Co 7606 N Clybourn Ave Sun Valley
Calif
SLUGIM—Star Expansion
SLUGIMS—Star Expansion
SMITH DOLAND—Electric Arc Inc
Smith & Dove Mfg Co—see Ludlow Mfg Co Inc
SMITH DOLAND—Electric Arc Inc
Smith & Dove Mfg Co—see Fasco Industries
Smith-Star Corp Farmington Conn
Smith (F A) Mfg Co—see Fasco Industries
Smitheraft Corp 217 Everett Ave Chelsea 50 Mass
Smithcraft Lighting—see Smithcraft Corp
Smoot-Holman Co 321 N Eucalyptus Ave (P O Box
4097) Inglewood Calif
SMOOTH JAW—Champion DeArment Tool Co
SMOOTH-GOTE—All-State Welding Alloys Co Inc
SMOOTHIE—Circle F Mfg Co
SMAP IN—Reichert Float & Mfg Co
SNAP-IN—Tonic Sales & Engineering Co
SNAP-IN—Tonic Cable Electric Products
SNAP-IN—Cable Electric
SNAP-IN—Star Expansion
SNAP-IN—Cable Electric Co
SNAP-IN—Cable Electric Froducts Inc
SNAP-IN—Cable Electric Co
SNAP-IN—Cable Electric Co
SNAP-IN—Lable Electric Co
SNOWLITE—Luxor Lighting Div
SNO-KELE—Memoc Electric Cop
SNUB-SEAT—Anderson Electric Corp
SNUGFIT—Paine Co
Snuder (M L & Son Inc 1897 E York St Philadel-SNUB-SEAT—Anderson Electric Corp
SNUB-FEAT—Anderson Electric Corp
SNUB-FIT—Paine Co
Snyder (M L) & Son Inc 1897 E York St Philadelphia 25 Pa
So-Cal Electro Products Inc 4423 W Jefferson Blvd
Los Angeles 16 Calif
Soapstone Co—see Soapstone Duct Co
Soapstone Duct Co 3985 Beach St Oakland Calif
SOCKET CINCHER—Kees (F D) Mfg Co
SODERTITE—G & W Electric Specialty Co
SODERTITE—G & W Electric Specialty Co
Sola Electric Div Basic Products Corp 1719 Busse
Rd Elk Grove III
Solar Electric Corp 121 Central Ave Warren Pa
Solar Light Mfg Co 400 North Ashland Chicago 22
III III
SOLARLITE—Solar Light Mfg Co
SOLARSPOT—Mole-Richardson Co
SOLAVOLT—Sola Electric Div
SOLDERALL—Brach Mfg Co
SOLDEREZE—Phelps Dodge Copper Products Corp
SOLDEREZE—Phelps Dodge Copper Coppe SOLDERUX -- Mico Instrument Co Solux Corp 58-17 28th Ave Woodside 77 LI New York
SOLVO-STAT—Hoyt Mfg Corp
SONALARM—Scott (H H) Inc
Sonotone Corp Elmsford NY
Soreng Div—see Control Co of America
Sorensen & Co Richards Ave South Norwalk
Sorgel Electric Co 838B W National Ave Mili Sorgel Electric Co 83818 W National AVE milwaukee 4 Wis
Sorgel Transformer Co—see Sorgel Electric Co
SOUND Equipment Corp—see Kwikheat Mfg Co
SOUND GUARD—Progress Mfg Co Inc
South River Metal Products Co Inc 377 Turnpike
South River NJ
Southco Div South Chester Corp Lester Pa

Southeast Lighting Inc 521 E 20 St Charlotte 1 Southeast Lighting Inc. 521 E 20 St Charlotte 1
NC
Southern Carbon Brush Co Inc. 7 18th St SW (P 0
Box 1710) Birmingham 1 Ala
Southern Electrical Co—see Olin Conductors
Southern Electrical Equipment Co 308 W Bland at
Mint St Charlotte 3 NC
Southwestern Industrial Electronics Co 10201 Westheimer (P 0 Box 22187) Houston 27 Tex
Southwire Co Carrollton Ga
SOVEREIGN—Miller Co
SPACE LITER—Sun-Lite Mfg Co
SPACE SAVER—Hyster Co
SPACE SAVER—Hyster Co
SPACE SAVER—Hyster Co
SPACESTER—Euro-Shepard Products Inc
SPACEMETER—Sun-Shepard Products Inc
SPACIALITE—Ainsworth Lighting Inc
SPACIALITE—Ainsworth Lighting Inc
SPACIALITE—Sun-Supply Div Armco Steel Corp
Spang-Challant Div—see Cope (T J) Div
Spang-Challant Div—see Cope (T J) Div
Spang-Challant Div—see National Supply Div Armco
Steel Corp Spang-Chalfant Diw—see National Supply Div Armco Steel Corp Steel Corp SPANTAP—Burndy Corp Spartan Electric Radiator Corp 52-55 74th St Maspeth 78 NY SPATIALITE—Manning (R A) Co Inc SPATTERPROOF—Radiant Lamp Corp Spaulding Fibre Co Inc 310 Wheeler St Tonawanda NY NY
SPAULDITE—Spaulding Fibre Co Inc
SPAULDO—Spaulding Fibre Co Inc
SPEAR—Jordan Co
Specialties Inc 2936 Sacramento St Pittsburgh 4 Specialties Inc 2936 Sacramento St Pittsburgh 4
Pa
SPECTROLUX—Luxor Lighting Products Inc
SPEED BAND—Capewell Mfg Co
SPEED CUT—Beaver Pipe Tools Inc
SPEED-KING—Beaver Pipe Tools Inc
SPEED-LOR—Capewell Mfg Co
SPEED-LOR—Garcy Lighting Div Garden City Plating
& Mfg Co
SPEED-LOR—All Plating Div Garden City Plating
& Mfg Co
SPEED-MANTIC—Beaver Pipe Tools Inc
SPEED MEASURE—Waldman (John J) Co
SPEED MANTIC—Beaver Pipe Tools Inc
SPEED SPIRAL—Super Tool Co
SPEED SPIRAL—Super Tool Co
SPEED SPIRAL—Super Tool Co
SPEED SPIRAL—Super Tool Co
SPEED AND COUNTY OF TOOL CO
SPEED AND COUNTY OF TOOL CO
SPEED MASTER—Accurate Engineering Co
SPEEDMASTER—Accurate Engineering Co
SPEEDMASTER—Levis-Shepard Products Inc
SPEEDNAIL—Allmetal Engineering Inc
SPEEDONAIL—Allmetal Engineering Inc
SPEEDOMAX—Levis Reverse Tool Co
SPEEDMASTERS—MASTER SPEED CO
SPEEDMASTERS—MASTER Electric Mfg Co
SPEEDMASTERS—MASTER Electric Div Reliance Electric & Engineering Co SPEEDRANGERS—Master Electric Div Reliance Electric & Engineering Co
SPEEDSAW—Thor Power Tool Co
SPEEDTOOLS—Thor Power Tool Co
SPEEDWAY—Wright Hoist Div
SPEEDWIRE—Slater Electric & Mfg Co Inc
Spencer Industries 1508 N Mascher St Phila 22
Pa Spencer Studios—see Spencer Industries Spencer Thermostat Div Metals & Controls Corp— see Metals & Controls Inc Spencer Turbine Co 486 New Park Ave Hartford 6 Spencer Turbine Co 48b New run Conn Sperce Electric Corp 20500 St Clair Ave Cleveland 17 Ohio 5) Onlogo Inc.—see Faraday Inc SPHERE.—Versen (Kurt) Co SPHEROLITE—Line Material Industries Sples Electric Works 564 W Van Buren St Chicago 7 III SPIES ELECTIC Works 564 W Van Buren St Chicago
7 II
SPINFAST—Scranton Storage Battery Corp
SPIRAFIL—Phelps Dodge Copper Products Corp
SPIRAFIL—Phelps Dodge Copper Products Corp
SPIRALFW—General Insulated Wire Works
SPIRALOR—General Electric Co
SPIRALOR—Merican Metal Moulding Co
SPIRALOR—Merican Metal Moulding Co
SPIRALON—Surprenant Mfg Co
SPIRAC—Westline Products Div
SPILGIT—Burndy Corp
SPORTITE—Duro-Test Corp
SPORTITE—Steber Div
SPIRAMAN—Ray-O-Vac Co
SPORTSLITER—Steber Div
SPRA-MASK—Mystik Adhesive Products Inc
Sprague Electric Co
SPRAMLITE—Silvay Lighting Inc
SPRAMASK—Mystik Adhesive Products Inc
SPRAMASK—Mystik Adhesive Products
SPRAMASK—Mystik Adhesive Products
SPRAMASK—Mystik Adhesive Products
SPRAMAS SPRING-O-MATIC—Industrial Electrical Works SPRING-0-MATIC—Industrial Electrical Works
SPRING WING—Paine Co
SPRING WINGS—Rawlplug Co Inc
SPRING SPRING WINGS—Rawlplug Co Inc
SPRINGIN—Star Expansion
Square D Co Electric Controller & Mfg Div 4493
Lee Rd Cleveland 28 Ohio
SQUARE DUCT—Square D Co
SQUEZON—Kearney (James R) Corp
STA-KON—Thomas & Betts Co
STA-OPEN—Royal Electric Corp
Sta-Tite Mfg Co 2000 Wyandotte Kansas City 8
Mo MO STA-VO-TROL—General Electric Co Apparatus Sales Sta-Warm Electric Co 53 N Chestnut St Ravenna

Stab-Rite Electric Products Co—see Stabrite Fluorescent Mfg Co
STAB-LOK—Federal Pacific Electric Co
STABLI-GLOW—Blue M Electric Co
STABLI-THERM—Blue M Electric Co
STABLI-RESuperior Electric Co
STABLIANE—Superior Electric Co
STABLAKER—Federal Pacific Electric Co
STABREAKER—Federal Pacific Electric Co
Stabrite Fluorescent Mfg Co
3550 Northwest 49 St
Stackpole Carbon Co
Stackpole Carbon Co
Stackpole St
St Marys
Pa
Stahl Metals Products Inc 4750 W 160 St
Cleveland
35 Ohlo Ohio Stahlin Bros Inc Belding Mich STAIRCART—Di-Acro Corp STAIRMASTER—Fairbanks Co STALEY—Fairbanks Co
STALEY—Feletric Switch Corp
STALOC—Mallory (P R) & Co Inc
Stamford Lighting—see Stamford Metal Specialty Co
Stamford Metal Specialty Co Inc 429 W Broadway
New York 12 NY
Stampings Inc Suite 314 321 24th St Rock Island
III
Stant Mfr. Co Inc. 524 Shames Dr. Messhury. NY Stampings Inc Suite 314 321 24th St Rock Island III
Stanat Mfg Co Inc 524 Shames Dr Westbury NY
Stanat Tool Machine Co—see Stanat Mfg Co Inc
STANDARD—Circle F Mfg Co
Standard Asbestos Mfg Co 860 Evergreen Ave Chicago 22 III
Standard Electric Div Standard Dayton Corp P O
Box 1001 Dayton 1 Ohio
Standard Electric Mfg Co Inc Haddon Ave West
Berlin N)
Standard Electric Co Inc P O Box 6356 San Antonlo
9 Tex
Standard Electric Time Co 89 Logan St Springfield
2 Mass
Standard Electrical Products Co 2240 E Third St
Dayton 3 Ohio
Standard Portable Cord Co Inc Mayville NY
Standard Portable Cord Co Inc Mayville NY
Standard Transformer Co 140 Dana St N E Warren
Ohio Ohio
STANDCO—Sticht (Herman H) Co Inc
STANEON—General Cable Corp
Stanley Electric Tools—see Stanley Power Tools Div
Stanley Power Tools Div Stanley Works New Britain
Com STAPUT FAIRLEADER—Barry (Williams B) Co STAR—Standard Electric Co Inc Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY Star Expansion Mountainville NY
Star Expansion Bolt Co—see Star Expansion
STAR-GLO—Electro Lighting Corp
Star Kimble Motor Div—see Safety Electrical Equipment Corp ment Corp
STAR-LUX—Curtis Lighting Div
STAR-LUX—Revere Electric Mfg Co
STAR PIN—Star Expansion
STAR PIN—Star Expansion
STAR STRIKE—Star Expansion
STAR STRIKE—Star Expansion
STAR STRIKE—Comet Lamp Co
STAR STRIKE—Comet Lamp Co
STARLINE—Electro-Mechanical Instrument Co
STARLINE—Electro-Mechanical Instrument Co
STARLINE—Star Expansion
STARSTUD—Star Expansion
STARSTUD—Star Expansion
STARTI—Metric—Aircraft Specialties Inc
STARTIT—Aircraft Specialties Inc
STAT-PACK—Magnetic Amplifers Div
STATA—Square D Co Electric Controller & Mfg
Div STATA—Square D Co Electric Controller & Mfg Div STATELINE—Howard Industries Inc States Co 19 New Park Ave Hartford 6 Conn STATICATOR—Hewson Co Inc STATICK—Hirschman-Pohle Co Inc STATICK—Doyle (JE) Co STATISCOPES—Minerallac Electric Co STATOROL—General Electric Co Apparatus Sales STAVOLT—Christie Electric Corp STAVAISTER—Allen Cooler & Ventilator Inc STAZIN—Star Expansion STAXAUSTER—Allen Cooler & Ventilator Inc STAZIN—Star Expansion Stearns Electric Corp 120 N Broadway Milwaukee 2 Wis Stearns Electric Corp 2 WIS
Stearns Magnetic Inc—Stearns Electric Corp
Steber Div Pyle-National Co 2700 Roosevelt Rd
Broadview III
Steber Mig Co—see Steber Div Pyle-National Co
STEBERLITE—Steber Div Pyle-National Co 33 På
Steel Electric Products Co Inc 5602 18th Ave
Brooklyn 4 NY
Steel & Tubes Inc—see Republic Steel Corp
STEELARC—All-State Welding Alloys Co Inc
Steelduct Co Republic Steel Bldg Youngstown Ohio
STEELFLEX—Universal Metal Hose Co
STEELLGRIP—Armstrong-Bray & Co
STEELLGRIP—Armstrong-Bray & Co
STEELLWING—Hubbard & Co
STEELWING—Hubbard & Co
Steince-Ives Co Springfield Rd Union NJ
Stemco Mfg Co Box 9024 Stockyards Sta Denver
16 Colo
STEMMAN—Ringsdorff Carbon Corp 16 Colo Dux 9024 Stockyards Sta Denver STEMMAN—Ringsdorff Carbon Corp STEMMAN—Restinghoue Electric Corp Lamp Div Sterling Blower Co 791 Windsor St. Hartford Conn Sterling Electric Motor Inc. 5401 Telegraph Rd. Los Angeles 22 Calif Sterling Siren Fire Alarm Co Inc. 12 Bartlett St. Rochester B. NY Sternberg Mfg Co. 4510 Addison St. Chicago 41 III
Stevens Appliance Truck Co Norton Rd (P O Box 897) Augusta Ga
STEWART-AIRE—Stewart Industries Inc Stewart Bros Div Instrument Laboratories 315 W Walton PI Chicago 10 III
Stewart Industries Inc 320 E St Joseph St Indianapolis 2 Ind

Stewart Mfg Co Inc—see Stewart Industries Inc Sticht (Herman H) Inc 27 Park Place New York 7 NY 7 NY STICK-VAR-Electro-Technical Products Div STICKLEBACK-Tec Imports Stimple & Ward Co P O Box 1102 Pittsburgh 37 Pa STIRRUP—Burndy Corp STIXWEL—Clifton Mfg Co Inc STOCK PICKER—Rol-Away Truck Mfg Co Inc Stocker & Yale Inc Green St Marbiehead Mass STOCKLITE—Appleton Electric Co STOK-FOUNT—International Electric Fence Co Inc Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Stokes (F J) Machine Co—see Stokes (F J) Corp
Stonco Electric Products Co 333 Monroe Ave Kenilworth NJ
Stonce Mfg Co—see Stonco Electric Products Co
Stone Mfg Co—see Stonco Electric Row Misser
STORACE—American Steel & Iron Works
STORACE—American Steel & Iron Works
STORACE MASTER—Haaretel (Walter) Co
STORAGE MASTER—Haaretel (Walter) Co
STORAGE MASTER—Haaretel (Walter) Co
STORAGE MASTER—Haaretel (Walter) Co
STORAGE MASTER—Haaretel (Walter) Co
STRAIGHT-LINE—Leviton Mfg Co Inc
STRAIGHT-LINE—Leviton Mfg Co Inc
STRAIGHT-LINE—Leviton Mfg Co Inc
STRAIGHT-LINE—Pylen Mational Co
STRAIGHT-LINE—Pylen Mational Co
STRAIGHT-LINE—Pylen Mister Co
STRAIGHT-LINE—Pylen Mister Co
STRAIGHT-LINE—Pylen Mister Co
STRAIGHT-LINE—Stone Mister Co
SUBMERSION Mister Co
SUBMERSI Stokes (F J) Machine Co-see Stokes (F J) Corp Stonco Electric Products Co 333 Monroe Ave Ken Newark NJ
SUDDEN DEPTH—Paine Co
SUMEX Corp 33-40 57th St
Sulfa Corp 33-40 57th St
Sulfa Fletric Co—see Acme Lighting & Mfg Co
Sultan Lighting Co—see Acme Lighting & Mfg Co
Summit Instrument Co—see Seely Instrument Co Inc
SUMPTROL—Square D Co
Sun Electric Products Inc 28 S Day St Orange NJ
Sun-Heat Inc 998 E Woodbridge Detroit 7 Mich
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7 Mich
Sun-Iron Corp 7435 W Wilson Ave Chicago 31 III
Sunbeam Lighting Co 777 E 14th Pl Los Angeles 21
Calif Sunbeam Visionaire Lighting Co—see Sunbeam Lighting Co Co Sundh Electric Co—see Clark Controller Co Sunrise Products Co—see Vemaline Products Co SUNSWITCH—Ripley Co Inc Sunwarm Inc 1601 Jared Dr (P 0 Box 266) Kings-port Ten port Tenn
SUPAIRTHERMAL—Nordberg Mfg Co
SUPER—Surelite Products Co
SUPER CORONOL—General Electric Co Wire & Cable SUPER DREADNAUGHT—Gould-National Batteries Inc SUPER-EONITE—Kaiser Aluminum & Chemical Sales SUPER-EONITE—Kaiser Aluminum & Chemical Sales
Inc
SUPER-GRIP—Diamond Expansion Bolt Co Inc
SUPER HI—Westinghouse Electric Gorp
SUPER INDUSTRIAL—National Specialties Co Inc
SUPER INDUSTRIAL—National Specialties Co Inc
SUPER-LAG—Bussmann Mfg Div
SUPER-LOK—Steber Div Pyle-National Co
SUPER MAGNET—Cutler-Hammer Inc
SUPER POWER—Coffing Hoist Div
SUPER SERVICE—Accurate Mfg Co
SUPER SERVICE—Accurate Mfg Co
SUPER SERVICE—Accurate Mfg Co
SUPER SERVICE—General Cable Corp
SUPER SERVICE—Accurate Mfg Co
SUPER SERVICE—Mactional Super Service Co
SUPER SUPER-STIK—Superior Insulating Tape Co
SUPER SUCTION—National Super Service Co
SUPER SUPER-WHITE—Duro-Test Corp
SUPER-V-BEAM—Duro-Test Corp
SUPER-V-BEAM—Dur

SUPERIOR—Wall (P) Mfg Co Superior American Fire Alarm Div—see Fyr-Fyter Co Engineered Systems Div Superior Appliance Co—see Superior Interlock Corp Superior Carbon Products Co 9115 George Ave Cleve-land 5 Ohio Superior Electric Co 83 Laurel St Bristol Conn Superior Electric Mfg Co Inc—see Eagle Electric Mfg Co Inc Superior Insulating Tane Co 3100 Lambdin Ave St Superior Insulating Tape Co 3100 Lambdin Ave St Louis 15 Mo Superior Interlock Corp 73-39 Central Ave Glendale Superior I 27 NY Superior Interlock Corp 73-39 Central Ave Glendale 27 NY
Superior Mfg Co—see Superior Staple Mfg Co
Superior Prorelain Co 931½ Market St Parkersburg
W Va
Superior Staple Mfg Co 40 Commercial St Fitchburg Mass
SUPERJUSTABLE—Williams (J H) & Co
SUPERMARKETER—Miller Co
SUPERMARKETER—Williams (J H) & Co
SUPERMARKETER—Williams (J H) & Co
SUPERSHEAL—Anaconda Wire & Cable Co
SUPERSHEAL—Anaconda Wire & Cable Co
SUPERSHEATH—General Cable Corp
SUPERME—Maiser Aluminum & Chemical Sales Inc
SUPERME—Starenton Storage Battery Corp
Supreme Electric Products Co 194 Vassar St RochSUPERME—Scranton Storage Battery Corp
Supreme Lighting Co 600 E Turner St Los Angeles
Calif
SUPERNE—Collyer Insulated Wire Co
Supre Lighting Co 600 E Turner St Los Angeles
Supre Light Mg Co Inc 400-6116 F 161 St New York Calif
SUPERNE—Collyer Insulated Wire Co
SUPERNE—Collyer Insulated Wire Co
SUPC LUX Mfg Co Inc 406-416 E 161 St New York
51 NY
SUR-GROUND—So-Cal Electro Products Inc
SURCO—Supprenant Mfg Co
SURE-BUILT—Shure Mfg Corp
SURE-LITE—House-O-Lite Corp
SURELITE—Clean Sweep Co
Surelite Products Co 368 E 148 St New York 55
NY NY
Surety Rubber Co North High St Carrollton Ohio
SURF-A-LITE—Electro Lighting Corp
SURFA-ETCH—Rust-Oleum Corp
SURFA-ETCH—Rust-Oleum Corp
SURFA-SELE—Must-Oleum Corp
SURFACEDUCT—National Electric Div
SURFACEDIUCT—National Electric Div
SURFEEX—Pass & Seymour Inc
SURFLENE—Surprenant Mfg Co
SURFLENE—Surprenant Mfg Co
SURFLOW—Surprenant Mfg Co
SURFLOW—Surprenant Mfg Co
Surprenant Mfg Co Mass Surrette Storage Battery Co Inc Jefferson Ave Salem Mass Mass
SURVO—Surprenant Mfg Co
Suttle Equipment Co 135 LaSalle St Chicago 3 III
Swan Mfg Co 1801 W 26 St Vancouver Wash
SWAN-STATS—Swan Mfg Co
SWEATRITE—Dunton (MW) Co
SWEDG-ON—Lenco Inc.
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ
Swett (A L) Iron Works 166 Glenwood Ave Medina Swett (A L) Iron Works 166 Glenwood Ave Medina NY
Swett (A L) Iron Works 166 Glenwood Ave Medina NY
SWING-AWAY—Electrical Mfg Co
SWING-BASY—Anderson (Albert & JM) Mfg Co
SWING-BASY—Anderson (Albert & JM) Mfg Co
SWING-WA—General Electric Co Apparatus Sales
SWISS Jewel Co 225 Lafayette Bidg Phila 6 Pa
SWITCH-MA—General Electric Products Inc
SWITCH MAT—Recora Co Inc
SWITCH MAT—Recora Co Inc
SWITCH MAT—General Electric Co
SWITCHMATIC—Eagle Electric Mfg Co Inc
SWITCHSTAT—Penn Controls Inc
SWIVELITE—Amplex Corp
SYLKYD—Dow Corning Corp
SYLKYD—Down Corning Corp
SYLKYD—Down Corning Corp
SYLKYD—SWING Corning Corp
SYLKYD—Based Corp
SYNCHORSEA—U S Electrical Motors Inc
S

T

TA Mfg Corp 4607 Alger St Los Angeles 39 Calif T & B—Thomas & Betts Co T-O—Chase-Shawmut Co TEC—Circle F Mfg Co

TK—Tuttle & Kift Inc
T-POWER—Motorola Communications & Electronics Inc
T V Wire Products—see Tevco Insulated Wire
T-W—Taylor-Winheld Corp
TA POT—Mowell Instruments Inc
TAB-WELD—Square D Co Electric Controller & Mfg
Div Taco West Corp—see West Instrument Corp Taitco Div Tait Mfg Co 500 Webster St Dayton 1 Taco West Corp—see West Instrument Corp
Taitco Div Tait. Mfg Co 500 Webster St Dayton 1
Ohio
TAKK—Hewson Co Inc
TAL-BENDER—Hein-Werner Corp
Taik-A-Phone Co 5013 N Kedzie Ave Chicago 25 III
TAL-BENDER—Hein-Werner Corp
Taik-A-Phone Co 5013 N Kedzie Ave Chicago 25 III
TAL-BENDER—Hein-Werner Corp
TALLESCOPE—Up-Right Inc
TAMPIN—Star Expansion
TAN-O-MITE—House-O-Lite Corp
TAN-O-O-LITE—House-O-Lite Corp
TANN-TAN-O-MITE—House-O-Lite Corp
TANN-TAN-D-enter Control Co
TAN-SOL—Mailory (P R) & Co Inc
TANTALYTIC—General Electric Co
TAN-A-RAY—Penetray Corp
TAP-EZE—Bryant Electric Co
TAP-IT—U S Expansion Bolt Co
TAP-LITE—Minneapolis-Moneywell Regulator Co
TAP-ON—Tomic Sales & Engineering Co
TAP-EN-MATE—Molub Industries Inc
TAPE-MATE—Molub Industries Inc
TAPE-MATE—Holub Industries Inc
TAPE-MATE—Holub Industries Inc
TAPERDRUM—Art Metal Lighting Div
TAPIT—Burndy Corp
TATTELITE—Sittler Corp
TATTELITE—TESTE—TOSTE TANDON PAR
TAYLORITE—TAYLO Taylor Electric Inc 15400 Dale Detroit 23 Mich Taylor Fibre Co Norristom Pa Taylor-Winfield Corp 1052 Mahoning Ave NW Warren Aylor-Winfield Corp 1052 Mahoning Ave NW Warren Order Order 15001-03 Califa St Van Nuys Calif Technical Development Corp—see Haydon (A W) Co Technical Electronics Co-see Haydon (A W) Co Technical Electronics Co-see Haydon (A W) Co Technical Electronics Corp—see Haydon (A W) Co Technical Electric Mfg Co Technical Electric Mfg Co Technical Electric Mfg Co Technical Electronics Corp E TEMPLEX—Minnesta Mining & Mfg Co Irvington Div TEMP-D-LARM—Kidde Ultrasonic & Detection Alarms Div TEMP-P-C-LARM—Kidde Ultrasonic & Detection Alarms Div TEMP-R-TAPE—Connecticut Hard Rubber Co TEMP-R-MORE — To Inc TEMP-R-MORE—ETC Inc TEMPA-TUBE—Acra Electric Corp TEMPBCALD—Hitemp Wires Co TEMPCLAD—Hitemp Wires Co TEMPCLAD—Hitemp Wires Co TEMPCLAD—Hitemp Wires Co TEMPCHERM—General Controls Co TEMPENE—Hitemp Wires Co TEMPTENE—Hitemp Wires Co TEMPTUBE—Hitemp Wires Co TEMPAX—DIAMONE KENDALON TO TEMPAX—SHINGLE—Javex Electronics TENNA-TUBE—Javex Electronics Tennessee Plastics Inc Box 3117 Carroll Reece Branch Johnson City Tenn TENS-A-MATIC—Murray Equipment Co Inc TENSILOK—General Cable Co TENSITE—Driver (Wilbur B) Co TENSILEX—Tensolite Insulated Wire Co Inc Tensolite Insulated Wire Co Inc Tensolite Insulated Wire Co Inc Tensol Co Toos Raymond Ave St Paul 14 Minn TERAGLAS—Natura Corp TERMINAL BLOCKS—Wama Co TERMITE—Reiton Corp
Termite Drills Inc—see Reiton Corp
TERRA-TRAN—R T & E Corp
TESCO—Eastern Specialty Co
TEST-MASTER—Amprobe Instrument Corp
TESTO LITES—Brach Mfg Co
TESTONIC—Blue ME Electric Co
TETCO—Electric Tachometer Corp
Texos Insulasted Wire 10B E Prospect Ave Burbank
Calif
Texas Crossoting Co P O Box 131 Orange Tex
TEXSLIDE—Allis-Chalmers Mfg Co
TEXSUN—Gar Wood Industries Inc
Tey Mfg Co—see United States Air Conditioning Comp
Theiler (H J) Corp Ashmont Ave Whitinsville Mass
Thepits Mfg Co Greeg & Hammond Sts Carnegie Pa
Ther Electric & Machine Works 17 S Jefferson St
Chicago 6 Ill
THERM-O-METER—Simpson Electric Co
THERM-O-METER—Simpson Electric Co
THERM-O-TRON—Trind Products Ltd
THERMA-NARK—Horth Shore Nameplate Div
Thermador Electrical Mfg Co 5119 District Blvd
Los
Angeles 22 Calif
THERMAL-AIRE—Garden City Fan & Blower Co
Thermal-Aire Inc—see Thermal-Aire of America Inc
Thermal-Aire Inc—see Thermal-Aire of America Inc
Thermal-Aire of America Inc 10 State Street (Room
905) Bostom Mass
Thermal American Fused Quartz Co
THERMALEZE—Phelps Dodge Copper Products Corp
THERMALEZE—Phelps Dodge Copper Products Corp Quartz Co
THERMALEZE—Phelps Dodge Copper Products Corp
THERMALINE—Line Electric Co
THERMALL—Larose (WT) & Associates Inc
THERMALOAD—Monitor Controller Div Atlee Corp
THERMALOAD—Monitor Controller Div Atlee Corp
THERMALON—Hitemp Wires Co
THERMASTER—Willard Storage Battery Div
THERMOSTER—Person Springs Instrument Co Inc
Thermo Electric Mfg Co—see Thermolyne Corp
THERMO-TECTOR—General Electric Co Apparatus
Saleis THERMO-TECTOR—General Electric Co Apparatus Saleis
THERMO-TIP—Ideal Industries Inc
THERMO-TIP—Ideal Industries Inc
THERMO-TIPEX—Triangle Conduit & Cable Co Inc
THERMOLAIN—Star Porcelain Co
THERMOLAIN—Gutler-Hammer Inc
THERMOLAIN—Gutler-Hammer Inc
THERMOLAIN—Gutler-Hammer Inc
THERMOLAIN—Gutler-Hammer Inc
THERMOLAITIC—Wall (P) Mfg Co
THERMOSTATIC—Wall (P) Mfg Co
THENAIN THE CO
THETA—Trombetta Solenoid Corp
THETA—Trombetta Solenoid Corp
THETA—Trombetta Solenoid Corp
THIMILINE—Sun-Lite Mfg Co
THINILINE—General Electric Co Major Appliance Div
Room Air Conditioner Dept
THINPLATE—Park Nameplate Co Inc
THIRTY—Gould-Mational Batteries Inc
Thomas Associates—see TA Mfg Corp
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ
Thomas Instrument Co Box 41 Liverpool Rd Phoenix
NY
NOTE THOMAS CONTRACTOR OF THOMAS AND THOMAS ASSOCIATES—See TA Mfg Corp.
Thomas Instrument Co Box 41 Liverpool Rd Phoenix
NY
NOTE THOMAS CONTRACTOR OF THOMAS ASSOCIATES—See TA Mfg Corp.
Thomas Instrument Co Box 41 Liverpool Rd Phoenix
NY
NOTE THOMAS CONTRACTOR OF THOMAS ASSOCIATES—See Delta-Star Electric Div Thomas (R) & Sons Co-see Delta-Star Electric Div HK Porter Co Inc Thompson Electric Co P 0 Box 873 Cleveland 22 Ohio Thompson (Henry G) & Son Co 277 Chapel St New Haven 5 Conn Haven 5 Conn
Thompson Mrg Co 611 Stevens St Geneva III
Thor Power Tool Co 175 N State St Aurora III
THOREX—Ohio Brass Co
THORO-FLARE—Emarco Corp
THRED-O-MATIC—Collins Machinery Corp
THRED-O-MATIC—Collins Machinery Corp
THREE "S"—Electrical Engineers Equipment Co
THREE "G"—Gruber Bros Inc
THREE "G"—Gruber Bros Inc
THREE-U-LITE—Morthers Incandescent Lamp Co
THRIFTY—Marathon Battery Co
THRIFTY—CALL—Simpson (Mark) Mrg Co Inc
THUNDER-TWIST—New England Carbide Tool Co Inc
THUNDER-TWIST—New England Carbide Tool Co Inc
THUNDER-TWIST—New England Carbide Tool Co
THUNDTAM-THOST—Own Electric Co
TI-GUE—Thomas Instrument Co
TI-MITE—Paragon Electric Co
TI-MITE—Paragon Electric Co
TI-MITE—Paragon Electric Co
TIFFIN—Quincy Mrg Co
TIGER BRAND—American Steel & Wire Div United
States Steel Corp TIFFIN—Quincy Mfg Co
TIGER BRAND—American Steel & Wire Div United
States Steel Corp
Tigerman Engineering Co 4332 N Western Ave Chicago 18 II Mfg Co Inc 209 Los Molinos San
Clemente Calif
TILECOTE—Wilbur & Williams Co Inc
TIMEER.INE—Dixie Controller Inc
TIMEFA.TROL—Acro Switch Div
TIME-A-TROL—Acro Switch Div
TIME-A-TROL—Acro Switch Div
TIME-MINDER—International Register Co
TIME-MINDER—Milland Storage Battery Div
Times Appliance Co Wire & Cable Div—see Times
Wire & Cable Div International Silver Co
Wallingford Conn
TIN-EZY—Johnson Mfg Co Inc Wallingford Conn
TIN-EXY—Johnson Mfg Co Inc
TINOL—American Solder & Flux Co
TINY-GLOW—Industrial Devices Inc
TINY-LTES—Drake Mfg Co
TIP-TOP—General Cable Co
TIP-TOP—Relton Corp
TIPITO—Relton Corp
TIPITO—Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc
TIPLETS—Ungar Electric Tools Div of Eldon Industries Inc
TIREX—Simplex Wire & Cable Co

TITAN—Detroit Hoist & Machine Co
Titchener (E H) & Co 67 Clinton St Binghamton NY
TITE-BEND—Thomas & Betts Co
TITE-BITE—Thomas & Betts Co
TITE-BITE—Thomas & Betts Co
TITE-BITE—Thomas & Betts Co
TITEBLT—Phelps Dodge Copper Products Corp
Tobe Deutschmann Corp Providence Highway Norwood
Mass
Tocco iv Ohio Crankshaft Co 3800 Harvard Ave
Cleveland 5 Ohio
Tod-Lite Inc 3401 N W 10 St Oklahoma City Okla
TOG-Lite Inc 3401 N W 10 St Oklahoma City Okla
TOG-L-SNAP—I-T-E Circuit Breaker Co
Mich
Toledo Pipe Threading Machine Co P 0 Box 1678
Toledo Pipe Threading Machine Co P 0 Box 1678
Toledo 3 Ohio
Toledo 3 Ohio
Toledo 3 Ohio
Toledo Standard Commutator Co—see Toledo Commutator Co
Toledo 3 Mich
Toledo 3 Ohio
Toledo 3 Ohio
Toledo Standard Commutator Co—see Toledo Commutator Co
Tolen (William) & Son Inc 4041 Ridge Ave Philadelphia Pa
Tomic Sales & Engineering Co 20000 Sherwood Ave
Detroit 34 Mich
TONEPAK—Lee Electric Inc
TONGTEST—Columbia Electric Mfg Co
TONOTRON Hughes Aircraft Co
TONNARC—American-Standard
TOOTS-E—Lovsted (C M) & Co Inc
Topflight Tape Co—see Topflight Corp
TopHETS—Driver (Wilbur B) Co
TOPHET—Driver (Wilbur B) Co
TOPHET—Oriver (Wilbur B) Co
TORMASTER—Tork Time Controls Inc
TORKOL—Line Material Industries
TORNAD—Revuer Fleeteric Mfg Co TORK-MASTER—General Control Corp
Tork Time Controls Inc 1000 Grove St Mt Vernos
NY
TORKMASTER—Tork Time Controls Inc
TORKOL—Line Material Industries
TORKOL—Line Material Industries
TORKAD—Brewer Electric Mfg Co
TORPAD—Brewer Electrols Co
TORPAD—Incomplete Co Inc
TORQUE LIFT—Atlas Overhead Door Co
TORQUE LIFT—Atlas Overhead Door Co
TORQUETROL—Electronic Control Corp
TORGUENT—Trane Co
TOTALIME—Wilbur & Williams Co
TOTALIME—Wilbur & Williams Co
TOUCH-A-MATIC—Eagle Electric Mfg Co Inc
TOUCH-A-MATIC—Eagle Electric Mfg Co Inc
TOWN-E MTGEMEN Mfg Cop Box 1970 Long Beach Calif
TOUCHETTE—Rodale Mfg Co Inc
Tower Craftsmen Inc 105 Chestnut St Red Bank NJ
TOWN & HIGHWAY—Westinghouse Electric Corp
TOYLIGHT—Aerolux Lights Corp
TRAG-0-LITE—Comet Lamp Co
Trade Service Publications Inc 341 E Ohio St Chicago 11 III
Trade-Wind Div Robbins & Myers Inc 7755 Paramount Div Robbins & Myers Inc
TRADELITER—Duro-Test Corp
TRAFFLEX—Crouse-Hinds Co
Trane Co 2nd & Cameron Ave La Crosse Wis
TRANFO-UNIT—I-T-E Circuit Breaker Co
TRANS-ALARM—Tigerman Engineering Co
TRANS-CHARM—Tigerman Engineering Co
TRANS-SALARM—Tigerman Engineering Co
TRANS-CO-MATIC—Lake Shore Electric Corp
TRANSCETER—Stromberg Div General Time Corp
TRANSCETER—Hinds Co Invington
Div
TRANSI-MAG—Magnetic Amplifiers Div
TRANSCETTA TASH—U-I Like Mfg Co Div TRANSI-MAG—Magnetic Amplifiers Div TRANSISTA FLASH—U-C Lite Mfg Co TRANSISTE—Johns-Manville Transolite Corp 515 Madison Ave New York 36 TRANSTIE—Joins-Mainville
Transolite Corp 515 Madison Ave New York 36
NY
TRANSPORTER—Automatic Transportation Co
TRANSRACK—Sangamo Electric Co
TRANSRACK—Sangamo Electric Co
TRANSTACKER—Automatic Transportation Co
TRANSTACKER—Automatic Transportation Co
TRANSTACKER—Automatic Transportation Co
TRANSVERTER—Hertner Electric Co
TRANSVERYOR—Automatic Transportation Co
TR Triangle Instruments Co—see Epco Electronics Inc Trico Fuse Mfg Co 2948 No 5th St Milwaukee 12 Wis Wis
TRICO-MIST—Trico Fuse Mfg Co
TRICON—Triangle Conduit & Cable Co Inc
TRIEX—Triangle Conduit & Cable Co Inc
TRIFORMANCE—Triangle Conduit & Cable Co Inc
TRIG—Rustan Corp

TRIG-R-MEAT—Wall (P) Mfg to
TRIG TOWERS—Rostan Corp
TRIMLINE—Rome Cable Div of Alcoa
Trimount Instrument Co—see Trimount Instrument Div
General Controls Co
Trimount Instrument Div General Controls Co 8080
McCormick Blvd Skokie III
Trindl Products Ltd 1807-11 S Clark St Chicago 16 Trindl Products Ltd 1807-11 S Clark St Chicago 16
III

Trine Mfg Corp 1430 Ferris Place New York 61 NY
Trio Laboratories Inc Expressway Industrial Park
Plainview NY
TRIOLENE—Triangle Conduit & Cable Co Inc
TRION—Chase-Shawmut Co
TRION—Chase-Shawmut Co
TRIONEDE—Triangle Conduit & Cable Co Inc
TRIONEDE—Triangle Conduit & Cable Co Inc
TRIOPENE—Triangle Conduit & Cable Co Inc
TRIOSCEAL—Triangle Conduit & Cable Co Inc
TRIOSCEAL—Triangle Conduit & Cable Co Inc
TRIOZONE—Triangle Conduit & Cable Co Inc
TRIPO-U-INK—Kearney (James R) Corp
TRIP-O-LINK—Kearney (James R) Corp
TRIP-SAVER—Kearney (James R) Corp
TRIP-SAVER—Kearney (James R) Corp
TRIP-LITE—Marco Industries
TRIPLE-A—Quigley Co Inc
Triple-A Specialty Go 2835 N Western Ave Chicago
18 III
Triplett Electrical Instrument Co 286 Harmon Rd TRIPLE-A—Quigley Co Inc
Triple-A Specialty Co 2835 N Western Ave Chicago
18 III
Triplett Electrical Instrument Co 286 Harmon Rd
Biufton Ohio
TRIPLEYE—Chance (A B) Co
TRIPLOC—Pyle-National Co
TRIPLOC—Pyle-National Co
TRIPLOC—Pyle-National Co
TRIPLOC—Tyle-National Co
TRIPLOC—Tyle-National Co
TRIPLOC—Tyle-National Co
TRIPOMATIC—Kearney (James R) Corp
Trippe Mfg Co 133 N Jefferson St Chicago 6 III
TRIPUMATIC—Kearney (James R) Corp
Trippe Mfg Co 133 N Jefferson St Chicago 6 III
TRIPUMATIC—Triangle Conduit & Cable Co Inc
TRISTEEL—Triangle Conduit & Cable Co Inc
TRISTEEL—Triangle Conduit & Cable Co Inc
Triton Mfg Co Inc
East Haddam Conn
TROJAN—Hexacon Electric Co
Trojan Lighting Co 663 State St San Diego Calif
TROL-E-OUCT—L-T-E Circuit Breaker Co BullDog
Electric Products Div
Trombetta Solenoid Corp 329 N Milwaukee St Milwaukee 2 Wis
TROMBOLITE—Amplex Corp
TRON—Bussmann Mfg Div
TROPIC-GLO—Knapp-Monarch Co
TRUPIC-GLO—Knapp-Monarch Co
TRUPIC-GLO—Knapp-Monarch Co
TRUPIC-GLO—Knapp-Monarch Co
TRUPIC-RIME—McGraw-Edison Co Albion Div
TROUBLE SAVER—Patent Scaffolding Co Inc
TRU-SET—Ramset Fastening System
TRU-START—Holub Industries Inc
TRU-TORK—Nankervis (Geo L) Co
TRUP-OWER—Perkins Battery Co
Truco Masonry Drilling Div Wheel Trueing Tool Co
3200-3220 W Davison Ave Detroit 38 Mich
TRUCCLIE—Guth (Edwin F) Co
Trumbull Components Dept—see General Electric Co
Truto Masonry Drilling Div Wheel Trueing Tool Co
3200-3220 W Davison Ave Detroit 38 Mich
TRUCLIE—Guth (Edwin F) Co
Trumbull Components Dept—see General Electric Co
Truto Masonry Drilling Div Wheel Trueing Tool Co
3200-3220 W Davison Ave Detroit 38 Mich
TRUCLITE—Guth (Edwin F) Co
Truto Masonry Drilling Div Wheel Trueing Tool Co
3201-3220 W Davison Ave Detroit 38 Mich
TRUCLITE—Guth (Edwin F) Co
Truto Masonry Drilling Div Wheel Trueing Tool Co
3201-3220 W Davison Ave Detroit 38 Mich
TRUCLITE—Guth (Edwin F) Co
Truto Masonry Drilling Div Wheel Trueing Tool Co
3200-3220 W Davison Ave Detroit 38 Mich
True Masonry Drilling Troit Co
True Masonry Drilling Troit Co
True Masonry Drill Calif
TURCO-SOLV—Turco Products Inc
Turkey Creek Mfg Co.—see Von Corp
TURN TYTE—Rodale Mfg Co Inc
TURNDICATOR—General Controls Co
TURNDICATOR—General Controls Co
TURNEX—Woodhead (Daniel) Co
TURNEX—Woodhead (Daniel) Co
TURNLOK—Pass & Seymour Inc
TURNLOK—Ceneral Electric Co
TURLE & Kift Inc 1823 N Monitor St Chicago 39 Tuttle & Kift Inc 1823 N Monitor St Chicago 39
III
TWIN—General Electric Co Apparatus Sales
TWIN-LUG—Blackburn (Jasper) Corp
TWIN-LUG—Blackburn (Jasper) Corp
TWIN-SIX—Burgess Battery Co
TWINDUCT—National Electric Div H K Porter Co
TWINDUCT—Atomal Electric Div H K Porter Co
TWINST-IN—Tomic Sales & Engineering Co
TWIST-IN—Tomic Sales & Engineering Co
TWIST-LOC—Universal Metal Hose Co
TWIST-LOC—Universal Metal Hose Co
TWIST-MOUNT—Pyramid Electric Co
TWIST-MOUNT—Pyramid Electric Co
TWIST-TITE—Hubbell (Harvey) Inc
TWIST-TITE—Hubbell (Harvey) Inc
TWO-SHOT—Kaiser Aluminum & Chemical Sales Inc
TY-RAP—Thomas & Betts Co
TYNEE-DRY—Pyramid Electric Co
TYNIES-MOY—Pyramid Electric Co
TYNISWITCH—American-Standard Controls Div
TYPHOON—Typhoon Air Conditioning Div
Typhoon Air Conditioning Div Hupp Corp 505 Carrell
St Brooklyn 15 NY III

Typhoon Prop-R-Temp-see Typhoon Air Conditioning Div
TYPOTRON—Hughes Aircraft Co
TYSON—SKF Industries Inc
TYTEX—Exide Industrial Div
TYTON—U S Expansion Bolt Co

#### U

U-BLADE—Leviton Mfg Co Inc
U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 III
U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 III
U-RAD—Wiegand (Edwin L) Co
U-RE-LITE—1-7-E Gircuit Breaker Co
USG—Unite States Graphite Co
UTC—United States Graphite Co
UTC—United States Graphite Co
UTC—United Transformer Corp
UFLEX—Hatfield Wire & Cable Div
Continental Copper
& Steel Industries Inc
Ulanet (George) Co 413-15 Market St Newark 5 NJ
ULTI-MOLD—Royal Electric Corp
ULTRA-LITE—Revere Electric Mfg Co
ULTRA-LITE—Revere Electric Mfg Co
ULTRA-LITE—Revere Electric Mfg Co
ULTRA-LUTE—Revere Electric Uniter Vision of Corp
ULTRA-UAPOR—Viking Air Products Div
Ultra-Violet Products Inc 5114 Wainut Grove Ave
San Gabriel Calif
ULTRA-UAPE—Plastoid Corp
ULTRAVALVE—General Control Co
ULTRA-VERTER—Blonder-Tongue Laboratories Inc
ULTRAUME—Westinghouse Electric Corp
ULTRAVALVE—General Control Co
ULTRA-VERTER—Blonder-Tongue Laboratories Inc
Undoco Mfg Co—see United Mfg Div
UNDARK—United States Radium Corp
Ungar Electric Tools Div of Eldon Industries
UNI-BALLAST—Line Material Industries
UNI-BALLAST—Line Material Industries
UNI-BALLAST—Line Material Industries
UNI-BALLAST—Line Material Industries
UNI-CLIP—Unistrut Products Co
UNI-CLIP—Unistrut Breaker Co
UNI-CLIP—Unistrut Products Uni-FRAME—Ouy-Brite Lighting Inc
UNI-PACT—Faraday Inc
UNI-P Union Metal Mfg Co 1432 Maple Ave NE Canton 5 Ohio UNIPAK—Sprague Electric Co UNISEAL—Franklin Electric Co Inc UNISEAL—Johns-Manwille UNISHEAR—Stanley Power Tools Div UNISPEED—Stromberg Div General Time Corp UNISPLICE—Burndy Corp UNITSPLICE—Burndy Corp Electric Products Div UNITAP—Dossert Mfg Corp VINITAP—Dossert Mfg Corp
United Blower Co Inc. 193 Centre St. NY 13 NY
United Chromium—see Metal & Thermit Corp
United Cinephone Corp—see Ripley Co Inc
United Electric Controls Co 85 School St. Watertown
72 Mass United Electric Machinery Co 8545 W 64 Pt Arvada Colo United Electric Motor Co 178 Centre St NY 13 NY United Emterprises 15735 S Paramount Blvd Paramount Calif United Lighting & Celling Co 2828 Ford St Oakland 1 Calif United Mfg Co-see United Mfg Div United Mfg Div W L Maxson Corp 41 Haig St Hamden 14 Conn Inited Pressed Products Co—see UPPCO Inc United States Air Conditioning Corp P 0 Box 360 Delaware Ohio United States Air Conditioning Corp Skyworker Div Delaware Ohio S Electrical Motor Co Cadiz Ohio S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif United States Electrical Tool Co 3640 Llewellyn St Cincinnati Ohio

United States Electronics Corp 275 Warren St Lyndhurst NJ
U S Expansion Bolt Co State St & PRR York Pa
U S Gauge Co—see U S Gauge Div
U S Gauge Div American Machine & Metals Inc
Clymer Ave Sellersville Pa
United States Graphite Co 1621 Holland Ave Saginaw Mich U S MOTORS—U S Electrical Motors Inc United States Motors Corp 102 W Fifth Ave Oshkosh Wis U S PEERLESS—United States Rubber Co United States Petroleum Co 104 Lakeview Ave Clifton United States Radium Corp Hanover Ave Morristown NJ U S REVERE—United States Rubber Co U S ROYAL—United States Rubber Co United States Rubber Co 1230 Avenue of the Americas New York 20 NY United States Rubber Co Naugatuck Chemical Div 946K Elm St Naugatuck Conn U S Rubber Co Wire & Cable Div—see Kaiser Aluminum United Transformer Corp 150 Varick St New York 13 NY NJ United Wire & Supply Corp 1497 Elmwood Ave Providence 7 RI
UNITIZED—Magnatran Inc
UNITOP—Maliis-Chaimers Mfg Co
UNITRAN—Moloney Electric Co
UNITRAN—Moloney Electric Co
UNITRIP—Stromberg Div General Time Corp
UNITRIP—Stromberg Div General Time Corp
UNITROL—Cutler-Hammer Inc
UNITROL—Cutler-Hammer Inc
UNITROL—T-T-E Circuit Breaker Co
UNITRYE—Superior Interlock Corp
UNIVERSAL—Chicago Pneumatic Tool Co
UNIVERSAL—Hosfield Mfg Co
UNIVERSAL—Mueller Electric Co
UNIVERSAL—Mueller Electric Co
UNIVERSAL—Mueller Electric Co
UNIVERSAL—Gray Products Co
1558 First St Sandusky
Ohio
Universal Electric Co
300 E Main St Owosso Mich Ohio
Universal Electric Co 300 E Main St Owosso Mich
Universal Electric Sales Corp 3537 Lee Rd Cleveland
20 Ohio
Universal Mfg Corp 29-51 E 6th St Paterson NJ
Universal Metal Hose Co 2133 S Kedzie Ave Chicago
23 III Universal Mfg Corp 29-51 E 6th 5t Paterson NJ
Universal Metal Hose Co 2133 S Kedzie Aw Chicago
23 III
Universal Motor Co 438 Universal Dr Oshkosh Wis
Universal Power Corp—see Universal Electric Sales
Universal Wieder Corp—see Universal Electric Sales
Universal Winding—see Leesona Corp
Up-Right Inc Up-Right Scaffolds Div 1013 Pardee
St. Berkeley 10 Calif
UPLIFTER—Revolvator Co
Uptegraff Mfg Co R E P O Box 182 Scottdale Pa
URBAN LITE—Revolre Electric Mfg Co
Urell Inc Bradford Pa
USAIRCO—United States Air Conditioning Corp
USCO Power Equipment Corp 829 N 36th Way
Birmingham 4 Ala
Utica Drop Forge Tool Corp—see Utica Drop Forge &
Tool Div
Utica Drop Forge & Tool Div Keisey-Hayes Co
UTIL-A-YOOL—Templeton Kenly & Co
UTIL-A-YOOL—Templeton Kenly & Co
UTIL-A-YOOL—Templeton Kenly & Co
UTILI-SCOPE—Diamond Power Specialty Corp
UTILITE—Steber Div Pyle-National Co
Utilities Safety Supply Co Inc Jefferson St & Highway
SO Lee's Summit Mo
Utilities Service Co 1 Pine St Allentown Pa
UTILITY—Arex Co
Utility Body Co 1530 Wood St Oakland 7 Calif
Utility Service Co Inc 1620 13th St (P 0 Box 102)
Racine Wis
UVILUX—Burton Mfg Co

VCU—Guth (Edwin F) Co VHS RELAY—Assembly Products Inc V-S—Master Electric Div Reliance Electric & Engin-V-S—Master Electric Div Reliance Electric & Engineering Co V Fitting Co P O Box 1253 Merchantville NJ
VAC-A-BUBE—Rite-0-Lite Co
VAC-ATUBE—Rite-0-Lite Co
VAC-ATUBE—Rite-0-Lite Co
VAC-MINE—American Floor Machine Co
VAC-O-SEN CON—Hypro Engineering Inc
VAC-U-SEL—General Electric Co
VAC-O-SEL—General Electric Co
VAC-O-SEL—Pullman Vacuum Cleaner Corp
VACNOBILE—Pullman Vacuum Cleaner Corp
VACNOBILE—Pullman Vacuum Cleaner Corp
VACNOBILE—Pullman Vacuum Cleaner Corp
VACU-MASTER—Hayes (C I) Inc
VACU-MASTER—Hayes (C I) Inc
VACU-MASTER—Hayes (C I) Inc
VACU-MASTER—Square D Co Electric Controller & Mfg
Div VALIMITOR—Square D CB ETERLIA VALIBUTOR
DIV
Valley Fan Mfg Co Box 206 Fort Valley Ga
VALUBUL—Wheelock Signals Inc
VALV-AMP—General Electric Co
Van Dyke Diw—see AOW Corp
VANO—Coppus Engineering Corp
VAPO—TIE—Ideal Industries Inc
VAPOR LUX—Luxor Lighting Products Inc
VAPOR LUX—Luxor Lighting Products Inc
VAPOR LUX—Salley M Electric Ca
VAPORMASTER—Crouse-Hinds Co
VAPROTEX—Woodhead (Daniel) Co

VARBAND—Varflex Corp
VAREPACK—Electric Products Co
VAREI—Noin Brass Co
VARFIL—Varflex Corp
VARELAS—Varflex Corp
VARELAS—Varflex Corp
VARI-ANGLE—Weeksler Instruments Corp
VARI-ANGLE—Weeksler Instruments Corp
VARI-ANGLE—Weeksler Instruments Corp
VARI-ANGLE—Weeksler Instruments Corp
VARI-SPED—Trico Fise Mfg Co
VARI-SPED—Revers Pulley Div
Rediance Electric Co
VARIDOT—Curtis Lighting Div
VARIAC—General Radio Co
VARICUL—Superior Electric Co
VARIDOT—Simpson Electric Co
VARIDOT—Simpson Electric Co
VARIDOT—Simpson Electric Co
VARIDOT—Simpson Electric Co
VARIDOT—Varia—Weels of Co
VARITAP—Burndy Corp
VARY-TALLY—Veeder-Root Inc
VASCO—Mitchell Industries Inc
VASCO—Mitchell Industries Inc
VASCO—Mitchell Industries Inc
VECGA—Metalcraft Products Co Inc
VECGA—Metalcraft Products Co Inc
VECGA—Metalcraft Products Co Inc
Velocity Power Tool Co 201 N Braddock Are
Durgh B Pa
VELOMETER—Hilmols Testing Laboratories Inc
Velotronic 1106 Broadway New York 1 NY
VELVALUME—Oay-Brite Lighting Inc
VENTIAR—Coppus Engineering Corp
VENTILATOR—Active Specialty Corp
VENTILATOR—Active Specialty Corp
VENTILATOR—Active Specialty Corp
VENTILATOR—Active Specialty Corp
VENTURA—American-Standard
VENTURAFIL—Oppus Engineering Corp
VENTURA—American-Standard
VENTURAFIL—Meet Incurrent Corp
VENTURA—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—Memorican-Standard
VENTURAFIL—American-Standard
VENTURAFIL—Memorican-Standard
VENTURAFILO—General Control Co
VERSA GROUVE—An Tulsa 20 Okla

YICONA—Insul-8-Corp

VICORAY—Whitaker (Douglas C) Co Inc

VICTOR—Ludlow Mfg & Sales Co

VICTOR—Ludlow Mfg & Sales Corp

Victor Exterice Wire & Cable Corp 613 Main St

West Warwick RI

Victor Insulators Inc—see I-T-E Circuit Breaker Co

VICTOR JR—Trine Mfg Corp

VICTOR Specialties Inc 775 Main St

New Rochelle

NY

VICTOR SR—Trine Mfg Corp VICTOR SR—Trine Mfg Corp Victor Ventilator Co—see Victor Ventilator Div Victor Ventilator Div Philip Carey Mfg Co Middle-town Ohio Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio
VIEW PAK—Tevco Insulated Wire
VIEWLITER—Duro-Test Corp
VIGILITROL—Automatic Control Co
VIKING—Forsberg Mfg Co
VIKING—Hid-States Welder Mfg Co
VIKING Air Products Div Lau Blower Co 5601 Walworth Ave Cleveland 2 Ohio
Viking Instruments Inc East Haddam Conn
Vimco Mfg Co Inc Main St Holland NY
VIMCOLIGHT—Vimco Mfg Co Inc
VIMSOL—Rusgreen Mfg Co
VIrden (John C) Co 5009-6103 Longfellow Ave
Cleveland 3 Ohio
VIS-A-RAY—Duro-Test Corp
VIS-O-GLOW—Brach Mfg Co
VIS-O-GLOW—Brach Mfg Co
VIS-O-GLOW—Brach Mfg Co
VISA-VOLT—Advance Transformer Ce
VISA-VOLT—Advance Transformer Ce
VISA-WAITC—Co-operative Utilities Ce Inc
VISA-WAITC—Co-operative Original Ce
VISIONAIRE—Silvey Lighting Inc
VISIONAIRE—Silvey Lighting Div
VISIONAIRE—Silvey Lighting Ce
VISTALITE—Jay Lighting Mfg Co Inc
VISTALITE—Jay Lighting Mfg Co Inc
VISTALITE—Steber Div Pyle-National Ce

VISUALITE—Magni Flood Inc
VISULARM—Crouse-Hinds Co
VITAC—Glastic Corp
VITALITE—Adjustable Fixture Co
VITALOY—Billings & Spencer Co
VITROSILI—Thermal American Fused Quartz Co
VITROSILI—Thermal American Fused Quartz Co
VITROMAM—Star Porcelain Co
VITROMAMEL—Anaconda Wire & Cable Co
VITROTAL—Anaconda Wire & Cable Co
VITROTAL—Anaconda Wire & Cable Co
VIZ-A1D—Day-Brite Lighting Inc
VOGUE-LITE—Swivelier Co Inc
VOIGUE-LITE—Swivelier Co Inc
VOLSEAL—Johns-Mamville
VOLTACE—Auth Electric Co Inc
VOLTACE—Davenport Mrg Div Duncan Electric Co
VOLTACE—Davenport Mrg Div Duncan Electric Co
VOLTINE—Waveland Electric Co
VOLTINE—Waveland Electric Co
VOLTINE—Waveland Electric Co
VOLTACA-CAME Electric Corp
VON—Hewson Co Inc
VOYLOCAD—American Color
VIDROM—Swivelier Co Inc
VOYCALL—Lake Mrg Co
VU—ALL—Cable Electric Products Inc
VU-BREAK—General Electric Co Apparatus Sales
Vulcan Radiator Co 775 Capitol Ave Hartford 6
VULCAN TRIMLINE—Vulcan Radiator Co

#### W

W B—Ware Fuse Corp
WGR—Roller (Wm G) Inc
W & T—Wallace & Tiernan Inc
Waage Electric Inc 720 Colfax Ave Kenilworth NJ
Wac Engineering Co—see Wac Line Inc
Wac Line Inc 35 S St Clair St Dayton 2 Ohio
WAC-TAC—Wac Line Inc
Wachs (E H) Co 1525 N Dayton St Chicago 22 III
Waco Mfg Co 5250 W 130 St Cleveland 30 Ohio
Wadsworth Electric Mfg Co Inc 20-34 W 11th St
(Box 272) Covington Ky
WAFER—Keystone Electric Mfg Co
WAGENSELLER—Acme Mfg & Gasket Co
Wagner Electric Corp 6400 Plymouth Ave St Louis
33 Mo 33 Mo
Wagner Malleable Products Co 222 W Adams St
Chicago 6 III
Wagner Mfg Co Inc—see Lenco Inc
Wasner Mfg Co Inc—see Lenco Inc
Wasner Mfg Co Inc—see Lenco Inc
Wahlund (M Paul) Mechanical Laboratory P 0 Box 16
Grant Iowa
Wakefield Brass Co—see Wakefield Lighting Div
Wakefield Brass Co—see Wakefield Corp 731 S Water
St Vermilion Ohlo
Walco Electric Co 131 Blackstone St Providence 1
pt Waldman (John J) Co 477 Atlantic Ave Brooklyn 17 Walker Brothers P O Box 33 Conshohocken Pa Walker Div—see I-T-E Circuit Breaker Co Walker Walker Electrical Co Ino—see I-T-E Circuit Breaker
Co Walker Div
WALKERDUCT—Walker Brothers
WALKERLEX—Walker Brothers
WALKERLEX—Walker Brothers
WALKERSNE—Walker Brothers
WALKERSNE—Walker Brothers
WALKERSONE—Walker Brothers
WALKERSONE—Walker Brothers
WALKERZONE—Walker Brothers
WALKERSONE—Walker Brothers
WALKIE-WORKLIFTER—Economy Engineering Co
Walkirt Co 141 W Hazel St Inglewood 3 Calif
Wall (P) Mfg Co P 0 Box 71 Grove City Pa
WALL FIN—Trane Co
WALL FIN—Trane Co
WALL FIN—Trane Co
WALLEN—Art Metal Co
WALLERIP—Star Expansion
WALLORN—Wall (P) Mfg Co
WALLURNLITE—Gruber Bros Inc
Walser Automatic Timer Corp 420 Lexington Ave
New York 17 NY
Walton Laboratories Inc 1186 Grove St Irvington 11
NJ Walton Laboratories Inc 1186 Grove St Irvington 11 N.I NJ Wama Co Industrial Bldg Baltimore 2 Md WARCO—Federal Machine & Welder Co Ward Leonard Electric Co 28 South St Mount Vernon NY Vernon NY
Ware Bros—see Ware Fuse Corp
Ware Fuse Corp 4400 W Lake St Chicago 24 III
WAREHOUSER—Vale & Towne Mfg Co
Warner Electric Brake & Clutch Co Beloit Wis
Warren Lamp Co—see Solar Electric Co
Warrick (Chas F) Co 1964 W Eleven Mile Rd Berkley WARWICK-Hayden Twist Drill Co Washington Aluminum Co Inc Knecht Ave Pennsylvania RR Baltimore 29 Md
WASSCO GLO-MELT—American Electrical Heater Co
WATCH DOG—General Electric Co
WATCH MOG—General Electric Co

Waterman Products Co Inc 2445-63 Emerald St Phila 25 Pa WATERSEAL—Thomas & Betts Co WATERTITE—Okonite Co WATERTITE—Woodhead (Daniel) Co Watlow Electric Mfg Co 1376 Ferguson Ave St Louis 14 Mo Watteredge Co 19629 West Lake Rd Rocky River 16 Ohio Ohio Waukesha Motor Co Waukesha Wis Waveland Electric Co 5542 N Ashland Ave Chicago 40 III WEATHER-CHRON—Automatic Devices Div American Machine & Metals Inc WEATHER DUTY—Westinghouse Electric Corp Lamp WEATHER DUTY—Westinghouse Electric Corp Lamp
Div
WEATHER-FLO—Automatic Devices Div American Machine & Metals Inc
WEATHER-FLO—Automatic Devices Div American
Machine & Metals Inc
WEATHERST—Union Insulating Co Inc
WEATHEREST—Union Insulating Co Inc
WEATHEREST—Union Insulating Co Inc
WEATHEREST—Continental Electric Equipment Co
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Carrier Corp
WEATHERMASTER—Conditioner
Weaver (J A) Co 2110 Howard St St Louis 6 Mo
Webb Electric Mg Co 1701 S W Jefferson St Portland 1 Ore
Webb Electric Corp
Webb Electric Co 1900 Clark St Racine Wis
WEBSTER SOUND—Webster Electric Co
WEDGE-GRIP—Sherman (H B) Mfg Co
WEDGE-ON—Thomas & Betts Co
WEDGE-TITE—Kearney (James R) Corp
WEDGELOK—Adalet Mfg Co
WEDGIE—Insulation Mfrs Corp
WEDGTITE—Crouse—Hinds Co
WEDGIE—Insulation Mfrs Corp
WEDGTITE—Crouse—Hinds Corp Weiss & Mew York 11 NY
WEJ-IT—Kirel Inc
Wei-Lock Mfg Co—see Grip-Tite Mfg Co
Weksler Instruments Corp 195 E Merrick Rd Freeport
L I NY
Weksler Thermometer Corp—see Weksler Instruments
Corp Corp Corp 57-18 Flushing Ave Maspeth 78 LI NY
Welch Mfg Co—see Raydyne Corp
WeLCOME-LIGHT—Calumet Plastics Inc
Welcraft Products Co Inc—see Easy Heat Inc
WeLDANPOWER—Lincoln Electric Co
WELDPORSED—Kerrigan Iron Works Co
WELDMSTER—Lewis-Shepard Products Inc
WELDOX—Hardman (H V) Co Inc
WELDDX—Hardman (H V) Co Inc
WELDPOWER—Raytheon Mfg Co
Welduction Corp 19400 W Eight Mile Rd (P 0 Box
146) Southfield Mich
WELDUCTOR—Welduction Corp
Weller Electric Corp 601 Stone's Crossing Rd Easton
Pa Pa Weller Mfg Co—see Weller Electric Corp Wellington Machine Co 133 De Wolf St Wellington Ohio Ohio
Wellmade Metal Products Co 860 81st Ave Oakland
21 Calif
Wells Mfg Corp 250 Service Rd Three Rivers Mich
WELLSAW—Wells Mfg Corp
WELTRONARCH—Weltronic Co
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Weltronic Induction Heating Corp—see Welduction Corp Wen Products Inc 5808 Northwest Highway Chicago 31 III Welter wen Products inc Sous Northwest Highway Chicago 31 III Werner Co (R B) Inc P O Box 580 Greenville Pa WESCO—Westinghouse Electric Supply Co Wesix Electric Heater Co 390 First St San Francisco Wesix Electric Heater Co 390 First St San Francisco 5 Calif West Instrument Corp 4363 W Montrose Ave Chicago 41 III West Wind Corp 1800 Airport Way Seattle 4 Wash Westchester Brickote Products Co Inc 1528 Williamsbridge Rd NY 61 NY Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif Western Electro-Dechanical Co Inc 300 Broadway Colorado St Pasadena 1 Calif Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif Western Insulates Corp 1515 W Second St Hastings Western Plastics Corp 1515 W Second St Hastings Western Plastics Corp 1515 W Second St Hastings Neb Western States Equipment Company—see Lightonics Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa Westinghouse Electric Corp Lighting Div 1216 W 58th St (P 0 Drawer 5817) Cleveland 1 Ohio Westinghouse Electric Corp Standard Control Div Beaver Pa Westinghouse Electric Corp Standard Control Div Beaver Pa Westinghouse Electric Corp Standard Control Div Beaver Pa Westinghouse Electric Supply Co 3 Gateway Center (Box 448) Pittsburgh 30 Pa Westlinghouse Electric Supply Co 3 Gateway Center (Box 448) Pittsburgh 30 Pa Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif WESTON—Round (David) & Son Inc Weston Instrument Div—see Daystrom Inc Weston Instrument Div—see Daystrom Inc Weston Corp 652 Hudson St NY 14 NY Weston Orp 652 Hudson St NY 14 NY
WETOIL—Farrelloy Co
WEYCO—Young Electric & Mfg Co Inc
WHALE—Forsberg Mfg Co
WHEAT—Koehler Mfg Co Wheat Laboratories—see Koehler Mfg Co Wheatland Electric Products Co 500 Logan St Carnegie Pa WHEEL-ABOUT-Rich (Phil) Fan Mfg Co Inc.

Wheeler Electronic Corp 150 E Aurora St Waterbury 20 Conn Wheeler Insulated Wire Co—see Wheeler Electronic Wheeler Mfg Co Ross Rd Ashtabula Ohio Wheeler Reflector Co 275 Congress St Boston 10 Mass Wheelock Signals Inc Branchport Ave Long Branch NJ
WHIRLCLAD—Polymer Corp
Whirlpool Corp Benton Harbor
Whitaker (Douglas C) Co Inc 141 E Glenside Ave
Glenside Pa
Whitaker Reel Mfg Co 3704 Jackson St Monroe La
White (0 C) Sales Co 40 Green St Marblehead Mass
White-Rodgers Co 9797 Reavis Rd St Louis 23 Mo
Whitman & Barnes Div United Drill and Tool Corp
40600 Plymouth Rd Plymouth Mich
Whitney Blake Co 102 Pershing St New Haven 14
Conn Conn
WHIZ—Speedex M/g Co
WHICK-O-LITE—North American Electric Lamp Co
Wide-Lite Corp PO Box 191 Houston 1 Tex
WIDE-SPREAD—Holophane Co Inc
WIDE-VUE—Simpson Electric Co
Wiegand (Edwin L) Co 7637 Thomas Blvd Pittsburgh Wiegand (Edwin L) Co 7637 Thomas Blvd Pittsburgh 8 Pa WIFE-SAVER—Simpson (Mark) Mfg Co Inc WIL-GARD—Wilson Rubber Co WIL-SON Mfg Co Cloverport Ky Wilbur & Williams Co Inc 650 Pleasant St Norwood Mass Wide Drop Forge & Tool Co—see Wilde Tool Co Inc Wide Tool Co Inc Hiawatha Kans Wilder Mfg Co Inc Mechanic St E Erie Rallroad Port Jervis NY Wiley Office Wiley (R & W) Inc Wiley (R & W) Inc Wiley (R & W) Inc Burgh Co Inc Miley Wiley (R & W) Inc Wiley (R & W) Inc Burgh Co Inc Miley (R & W) Inc Bur NY Wilkoff (M J) Co 823 Locust Pittsburgh 19 Pa Willard Storage Battery Co—see Willard Storage Battery Div Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio Williams (J H) & Co 400 Vulcan St Buffalo 7 NY
Williams (Hugh B) Mfg Co 8330 Lovett St (P O
Box 7815) Dalias Tex
Williams (H E) Products Co 106 S Main St Carthage Williams (n E) Floods (n Mo Mo Mo Mo Wilmington Fibre Specialty Co New Castle Del Wilmon Castle Co Box 629 Rochester 2 NY Wilson (G C) & Co 1915 Eighth Ave Huntington Wilson (G C) & Co 1915 Engine Wilson (G C) & Co 1915 Engine Wilson (J A) Lighting & Display Inc 1502 Industrial Dr Erie Pa Wilson Rubber Co 1200 Garfield Ave S W Canton 6 Ohio Dr Erie Pa
Wilson Rubber Co 1200 Garfield Ave S W Canton 6 Ohio
Mison Rubber Co 1200 Garfield Ave S W Canton 6 Ohio
Mison Rubber Co 1200 Garfield Ave S W Canton 6 Ohio
Mincharger Corp
City 2 Iowa
WINCO—Wincharger Corp
WINDO-VENT—Reed Unit-Fans Inc
Wind-Way Fan & Ventilator Co 531 St Joseph St
New Orleans 12 La
WINDMAKER—Rich (Phil) Fan Mfg Co Inc
WINGO-DING—Diamond Expansion Bolt Co Inc
WINGG-DING—Diamond Expansion Bolt Co Inc
WINGFOIL—Wing (L J) Mfg Co
WINGFOIL—Wing (L J) Mfg Co
WINGFOIL—Wing (L J) Mfg Co
WINGG-NUT—Ideal Industries Inc
WINGFOIL—Wing (L J) Mfg Co
WINGE-UBE—Oldeal Industries Inc
WIRE-LUBE—Ideal Industries Inc
WIRE-LUBE—Ideal Industries Inc
WIRE-LUBE—Ideal Industries Inc
WIRE-NUTS—Ideal Industries Inc
WIRE-NUTS—Ideal Industries Inc
WIRE-WIRE—WING—Wing Corp
WIRE-NUTS—Ideal Industries Inc
WIRE MEXT—Omnite Mfg Co
WIRED HEAT—Weis Electric Heater Co
WIRED HEAT—Weis Electric Heater Co
WIRED OHAT—Weis Electric Heater Co
WIRED OHAT—More Simpson Mark) Mfg Co Inc
WIREMASTER—Champion DeArment Tool Co
WIREMASTER—Champion DeArment Tool Co
WIREMASTER—Champion DeArment Tool Co
WIREWA—National Electric Div
WINSCOL—Wisconsin Electrical Mfg Co Inc
WISCOL—Wisconsin Electrical Mfg Co Inc
WISCOL—Wisconsin Electric Info Co Inc
Wisconsin Carbon Corp—see Kirkwood Carbon Corp
WISCOL—Wisconsin Electrical Mfg Co Inc
Wisconsin Carbon Corp—see Wisconsin Carbon Corp
Wisconsin Carbon Corp—see Wisconsin Carbon Corp
Wisconsin Carbon Corp—see Wisconsin Carbon Corp
Wisconsin Storage Battery Co—see Wisco Div
Wisconsin Storage Battery Co—see Wisco Div
Wisconsin Carbon Corp—see Kirkwood Carbon Corp
Wisconsin Carbon Corp—see Wisco Div Wisconsin Carbon Corp—see Wisco Div Sconsin Carbon Corp—see Wisconsin Carbon Corp—see Continental-Wirt Electric Div
Wisconsin Carbon Corp—see Wisco Div Sconsin Carbon Corp—see Continental-Wirt Electric Div
Wisconsin Carbon Corp—see Wisco Div
Wisconsin Carbon Corp—see Wisco Div
Wiscon WIZARD—General Control Co Wodack Electric Tool Corp 4627 W Huron St Chicago Wodack Electric Tool Corp 4627 W Huron 3: Williams 44 III WOLMANIZED—Koppers Co Inc WONDABAR—Virden (John C) Co WONDER—American Pipe Bending Machine Co Inc WONDERLIVE—American Silver Co Inc WONDERLIVE—Magni Flood Inc WOOD BEAM—Neo-Ray Products Inc Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 Moodward Machine Co Lighting Div 4833 Elmhurst
Detroit 4 Mich
WORK BULL—Massey-Ferguson Industrial Div
Work-0-Lite Co 522 Cortlandt St Belleville 9 NJ WORKMAN—Ray-0-Vac Co Workrite Mfg Co 612-620 Colorado Ave Santa Monica Calif WORKSAVER—Yale & Towne Mfg Co

#### X

XIT—Iona Ventilator Co Inc
XL—Excel Fuse Co
X-L—Henderson Electric Co
X-PAN—National Lead Co
X-Ray Reflector Co—see Curtis Lighting Div
X-S WALLERIP—Star Expansion
X-SEAL—Allegheny Plastics Inc
X-TRACT-O—Trico Fuse Mfg Co
X-VAR—Fidelity Chemical Products Co:p
XCEL—Xcelite Inc
Xcelite Inc Thorne Ave at Bank St Orchard Park
NY
XDUCT—National Electric Div H K Po:ter Co
XELON—Times Wire & Cable Div
XTENSIONDUCT—National Electric Div H K Porter
Co

Youngstown Sheet and Tube Co P O Box 900 Youngs-town 1 Ohio YUKON—Perfeciite Co Y

#### Z

ZAMPA—Weiss & Biheller Merchandise Corp Zell-Alire Corp Orrton Ave Reading Pa Zellers Laboratories Heating Div—See Zell-Aire Co ZENITH—Scranton Storage Battery Corp Zenith Electric Co 155 W Walton St Chicago 10 Zenith Electric Go 155 W Walton St Chicago 10 III
ZEPHYR—Chester Hoist Div
Zerhickow (O) Co 15 Park Row New York 38 NY
Zerlo START—Phillips Mfg Co Inc
ZEVA—Roche (Paul C) Co Inc
ZEVA—Roche (Paul C) Co Inc
ZEVAINE-SHIELD—Wilbur & Williams Co
ZINC-SHIELD—Wilbur & Williams Co
ZINCS Electrical Products 729 Turner Los Angeles
12 Calif
Zinzeye Go—see Zinsco Electrical Products
ZIP-CLAP—Hall (William) Co
ZIP-CLEAT—Hall (William) Co
ZIP-CRETTE—Mid-States Welder Mfg Co
ZIP-CRETTE—Mid-States Welder Commical Sales Inc
ZIP-CRETTE—Mid-States Welder Mfg Co
ZIP-CRETTE—Mid-States Welder

Y-ER-EAS—Electro Compound Co
YAK—Mercury Mfg Co
Yale & Towne Mfg Co 11000 Roosevelt Bivd Philadelphia 15 Pa
YAGER'S—Benson (Alexander R) Co Inc
YANK—Mercury Mfg Co
YARD LITE—Markel Electric Products Inc
Yardney Electric Corp 40-50 Leonard St New York
13 NY
Yardney Laboratories Inc—see Yardney Electric Corp Yardney Electric Corp 40-50 Leonard St New York

13 NY

Yardney Electric Corp
Yeats Appliance Dolly Sales Co 2124 N 12th St
Milwaukee 5 Wis
Yellow Springs Instrument Co Inc P 0 Box 106
Yellow Springs Ohio
YEW—Yokogawa Electric Works Inc
Yokogawa Electric Works Inc
York Orp—see York Div
York Orp—see York Div
York Ica Machinery Corp—see York Div
YORKAIRE—York Div
YORKAIRE—Perkins Battery Co
Yorkville Motal Products Co
Yorkville Motal Products Co
Yorkville Motal Products Co
Yorkville Motal Products Co
York 14 NY
Young Bros Co
1831 Columbus Rd Cleveland 13
Ohio
Young Electric & Mfg Co Inc
2134 Curtis Denver
Zolo
Young Engine Corp P 0 Box 532 Canton Ohio
YOUNG MODERNS—Lightolier Inc
YOUNGSTOWN—Square D Co
Electric Controller &
Mfg Div

Mfg Div

#### PRODUCT SELECTION DATA

Detailed information on electrical products

This section contains data presented by manufacturers of electrical apparatus and supplies, utilization equipment, components, tools and accessories. Descriptions include installation and application data, performance characteristics and specifications.

Bold-face type and the symbol (•) are used in the Product Directory to indicate the location of information on specific equipment in this section.



## How to select a Remote Control Switch

Electrical engineers are increasingly incorporating Remote Control Switches into their wiring layouts and circuits. Remotes today are used not only for the instantaneous control of emergency equipment, where they are a must, but for safety, economy and convenience wherever light or power is being distributed over a wide area.

#### Selection of Type

The selection of the right remote for a particular application must be given some study, but basically there are only two factors which affect the selection of type: (1) the class of load: noninductive, such as heaters and lighting; or inductive, such as motors; (2) the voltages of the systems used.

#### Mixed Loads

Where there are mixed loads, noninductive load rating must not be less than the combined full-load currents nor less than 663/3 % of the maximum current to be interrupted.

Any connected motors should be evaluated on the basis of stalled rotor current, using the multiplier of six times motor current if the actual value is not known. These currents added to the non-inductive load current will establish the maximum current which the switch will have to interrupt. In specifying the switch capacity, give class of the load and the amount of the load which is to be controlled.

#### Why Mechanically Held

Another important selection-factor is that the remote control switch be mechanically held. Because it is essentially a feeder disconnect, the remote must be unaffected by line voltage conditions and respond only to control of the push buttons. ASCO mechanically held remotes insure against outages on vital circuits caused by momentary line voltage dips.

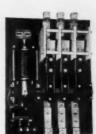
A detailed report on the advantages of ASCO remote control switches can be obtained by writing for new catalog

#### A selection of basic Remote Control Switches by ASCO

For Economy and Rugged Construction...



Use the Bulletin 920 - Up to 3 Poles, Single Throw, 30-75 Amps D-C, 30-200 Amps A-C. U.L. Approved to 600V A-C, 250V D-C. Recommended for all loads within its capacity range.



For Load Requirements Exceeding Capacity of the Bulletin 920 ...

Use the Bulletin 910-Up to 4 Poles, Single Throw, 30-400 Amps, 250 volts, A-C.

For Small Panelboard



Use the Bulletin 909 — Up to 5 Poles, Single Throw, 3 Poles, Double Throw, 30 Amps, 250 volts, A-C or D-C.

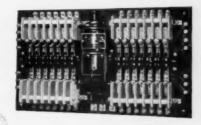


For High Capacity, Highly Inductive

Use the Bulletin 911-Up to 4 Poles, Single Throw, 30-1000 Amps, 600 volts, A-C, 250 volts, D-C.

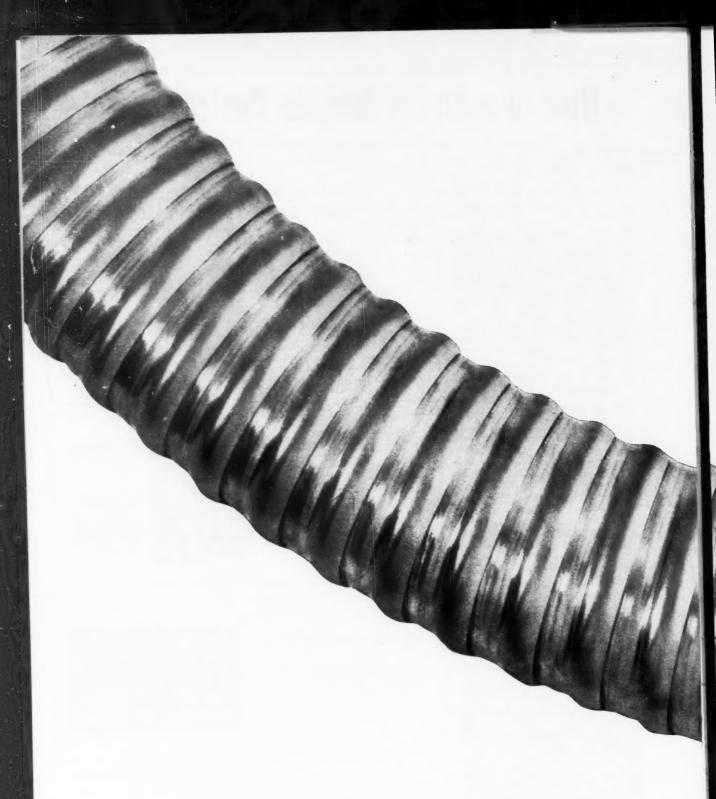
For Multiple Pole Requirements...

Use the Bulletin 915-Up to 24 Poles, Single or Double Throw, 30, 60 and 100 Amps, A-C.



## ASCO Electromagnetic Control ASCA.

REPERBABLE CONTROL BY AUTOMOTIC SWITCH CO. 50-1 HANDYER RD., FLORHAM PARK, N. J. - FRONTIER 7-4600 - AUTOMATIC TRANSFER SWITCHES - SOLEHOLD VALVES - ELECTROMAGNETIC CONTROL





#### American Steel and Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors Tennessee Coal & Iron Division, Fairfield, Alabama, Southern Distributors United States Steel Export Company, Distributors Abroad

#### Cut corners with flexible (USS) Armorlokt Cable



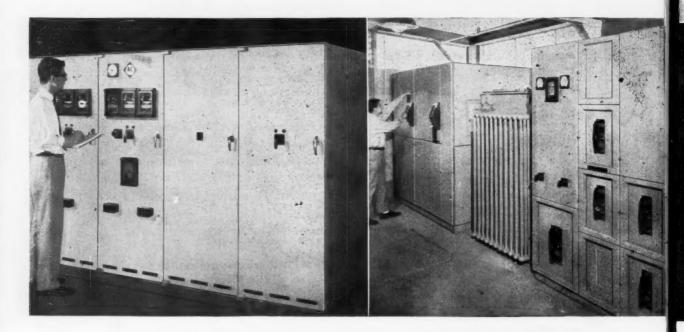
Remember your last conduit job . . . all the time and work needed to install junction boxes, not for new circuits but just so the cable could be pulled around corners? And the longer the pull, the more boxes you needed. USS Tiger Brand Armorlokt Cable could have been installed in approximately one-half the time and eliminated all that expensive pipe fitting and bending. Armorlokt installs as easily as ordinary cableyet it protects as well as rigid conduit, and sometimes even better because Armorlokt is flexible and "rolls with a punch." You can install it anywhere . . . up, down, across walls, buried in the ground, suspended in trays or on cable rings, indoors or outdoors. Armorlokt can be installed in long lengths, because its flexible construction permits easy and quick bending around corners, I-beams, or any other obstruction. And you can easily splice into Armorlokt Cable, anywhere along the entire length. . Armorlokt has a higher current-carrying capacity than the same size conductor in conduit because heat is quickly dissipated, not trapped inside. Corrosive atmospheres are no problem. Armorlokt is available with galvanized steel, stainless steel, aluminum or bronze armor. It's also available with an Ampyrol (PVC) jacket, in black or colors for easy identification. You can order Armorlokt with almost any kind of insulation. including varnished cambric, rubber, or asbestos up to four inches in diameter, rated 15,000 volts. There's a standard USS Tiger Brand cable for every special job. For the complete story on Armorlokt Cable or any other type cable, call our nearest sales office or write American Steel and Wire, Dept. 1265, Rockefeller Building, Cleveland 13, Ohio.

USS, Armorlokt and Ampyrol are registered trademarks

# Current news reports WHAT'S HAPPENING

## **ELECTRICAL SERVICES?**

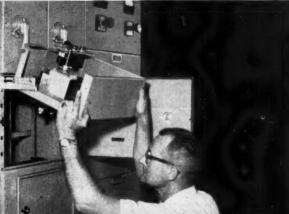
Highlights: A dry-type transformer that cuts installing time from 90 to 40 minutes. A motor control center that saves space. These examples demonstrate the extra value that is standard with Allis-Chalmers... the greater efficiency and the added productivity which are yours when you buy A-C products, systems and services. Call your nearby Allis-Chalmers office for details or write Allis-Chalmers, Industries Group, Milwaukee 1, Wisconsin.



Lowest height, easiest access 5-kv metal-clad switchgear on the market. Just 72 inches high, you get eye-level instrumentation, shoulder-height accessibility of component parts. Other outstanding advantages: front-accessible current transformers; maximum compartmentation and dead-front construction for greater safety; full-panel metering; rapid, one-stroke breaker insertion. Choice of Allis-Chalmers stored energy or solenoid operated circuit breakers.

Low cost answer to an outdated electrical system: An Allis-Chalmers unit substation. It distributes full power at the center of the load. Voltage drop and conductor losses are minimized . . . secondary wire to machines is shorter and less expensive. And there's no space problem! Mount an Allis-Chalmers unit substation anywhere, in a corner of the production floor, on balconies, in the basement. Metal enclosures eliminate need for vaults — and provide attractive appearance.

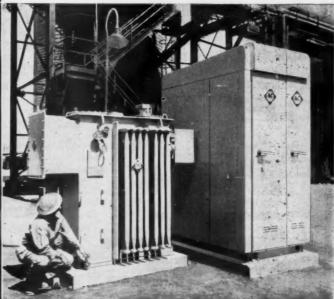




Cut installing time in half with new, whisperquiet dry-type transformers! Now 35% smaller, lighter, this new design eliminates common installation problems. Unique 3-piece case makes handling, wiring go like clockwork. You'll install them in 40 minutes instead of the usual 90 minutes. Every known factor in subduing noise has been incorporated... and exclusive Curvacore construction lowers exciting current, core losses. Requires no special insulating cable for hookup.

Control centers cut costs... You save space, simplify wiring and reduce inspection and maintenance expenses with new A-C low-voltage motor control centers. Plug-in terminal blocks and drawout construction cut inspection and maintenance time by making it quick and easy to withdraw or remove control units. Pushbuttons and pilot lights on removable frames eliminate failures common with hinged wiring. Special connectors make it impossible for bus connections to loosen.





Acid drips, but open motor's efficiency never drops: This Super-Seal open motor replaced a TEFC unit driving a pump in a vanadium and uranium extracting process. Though constantly subjected to drippage of a sulphuric acid and organic phosphate mixture, it keeps right on running. Its Poxeal insulation defies corrosives, moisture and contaminants. Open design gives a service factor of 1.15 . . . provides reserve capacity to meet sudden overloads.

Lower first cost is just one of many advantages of this packaged unit substation. Simplified engineering, planning and purchasing reduce installation and maintenance costs. These A-C units provide reduced power losses, better regulation and flexibility for expansion. Factory-assembled, wired and tested to meet all standards. Transformer types available to fit your needs include oil-filled, Chlorextol liquid-filled, dry-type and sealed dry-type units.

## Index of Phelps Dodge

Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE
	ACV	Armo-Lok	85 C (185 F)	Dry Locations
=== Hillinging	None	Armo-Lok	85 C (185 F) High Voltage	General Purpose: Consult manufac- turer for specific applications
	w		75 C (167 F)	Mining Machines, Dredges, Shovels,
ALAMAN PARTER PA	G	Portable Power Cable	Low Voltage	and similar portable applications Pennsylvania Dept. of Mines Flame Resistance Approval P-114. U. S. Bureau of Mines Listing P-114-BM.
	SHD		85 C (185 F) High Voltage	
12 de la constant militare	RHW	Flamestop Heat and Moisture Resistant	75 C (167 F)	Dry and Wet Locations
	RHH	Flamestop Heat- Resistant	90 C (194 F)	Dry Locations
	RHL	Heat Resistant Rubber Lead	75 C (167 F)	Wet Locations and other Special Conditions
PD-X-12-2	NM	PD-X Fibrous- covered, Non- metallic-Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores, and Shops.
PD-XT-12-2		PD-XT Thermo- plastic-covered, Nonmetallic- Sheathed Cable	60 C (140 F)	For Wiring Houses, Rural Buildings, Small Stores and Shops
TORRING DESIGNATION TO THE TATE OF TA	UF UF-NMC	Perma-Dure Nonmetallic- Sheathed Cable	60 C (140 F)	UF: Underground Feeder and Branch Circuit Cable for Direct Burial.
HABIRSHAW PERMA-OLINE TYPE UF 14/2				NMC: For Interior Wiring in Moist or Corrosive Locations.
	THW		75 C (167 F)	Dry and Wet Locations
	TW	Habirdure Thermo- plastic insulated	60 C (140 F)	Dry and Wet Locations
			60 C (140 F)	Fixture Wire
		Petro-Dure Thermo- plastic Insulated Nylon Jacketed	60 C (140 F)	Dry and wet locations and where ex- posed to mineral oil
	TW		30 C (86 F)	Where exposed to liquid gasoline and gasoline vapor.

PHELPS DODGE COPPER PRODUCTS CORPORATION

## Wires and Cables

Wires and Cables	Type Letter	Trade Name or Designation	Maximum Operating Temperature	USE	
	TW	Habirdure (9T)	60 C as TW 90 C as Appli- ance Wiring	NEC Type TW Bldg. Wire—60°C Appliance Wiring—90°C in air or 60°C in water or oil	
	None	Habirdure Appliance Wire	105 C (221 F) IN AIR 80 C (176 F) IN OIL	Appliance Wiring	
2/1	SE	Service Entrance Type SE — Style U Unarmored	75 C (167 F)	Service Entrance or Combination Service Drop & Service Entrance	
	SD	Service Drop Type SD	60 C (140 F)	Service Drop	
MAG STO TYPE UTIL — GOLV — NASHEDONNY COVIDINA	USE	Service Entrance Type USE	75 C (167 F)	Underground Service Entrance, Direct Burial.	
	V	Varnished Cloth Braided	85 C (185 F)	Dry locations only. Smaller than No. 6 by special permission.	
	VL	Varnished Cloth Lead	85 C (185 F)	Wet or Dry locations. Smaller than No. 6 by special permission.	
	None	Habirduct Habirprene	75 C (167 F) Low Voltage	General Purpose for Direct Burial, Aerial, Conduit and Underground Duct Installations.	
		Habirite Habirprene	85 C (185 F) High Voltage		
	S or SO	Hard Service Cord	60 C (140 F)	Pendant or portable extra hard usage in damp locations; SO for oil resistance	
	SJ or SJO	Junior Hard Service Cord	60 C (140 F)	Pendant or portable hard usage in damp locations; SJO for oil resistance	
<b>&gt;</b>	SP	All Rubber Parallel Cord	60 C (140 F)	For use in pendant or portable ap- plications in damp locations not sub- ject to hard usage	

## KILLARK...THE MOST COMPLETE of ALUMINUM FITTINGS and

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- · For standard and hazardous locations
- Fast, dependable deliveries from 19 strategic warehouse locations
- · Backed by over 40 years' experience

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#### EXPLOSION-PROOF FITTINGS



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In Canada: Killark Electric Ltd, 421 Islington Ave. South, Toronto

## and FASTEST-EXPANDING LINE FIXTURES IN AMERICA!

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CIRCUIT BREAKERS



MOTOR STARTERS





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LIGHTING FIXTURES - SPECIAL LOCATIONS









CATALOGS ON REQUEST



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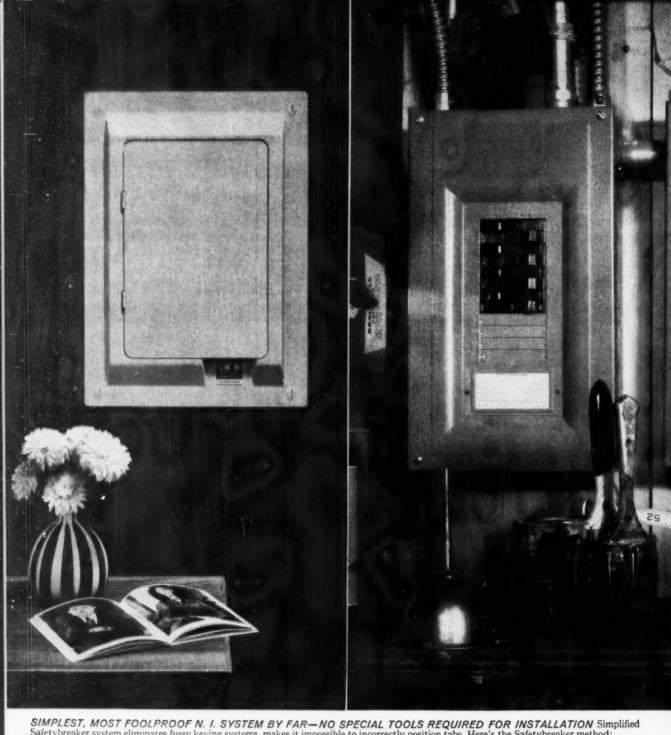
KILLARK ELECTRIC MFG. CO. Vandeventer & Easton, St. Louis 13, Mo. Geatlemen: Please send me following material:

- Explosion-Proof Fittings Catalog No. 13
- Condensed Catalog No. 59
- ☐ Vapor-Tight Light Fixtures Catalog No. 12
- Circuit Breakers Catalog No. 17

Name\_\_\_\_

Address

SOLD THROUGH LEADING DISTRIBUTORS WAREHOUSE STOCKS IN NINETEEN CITIES

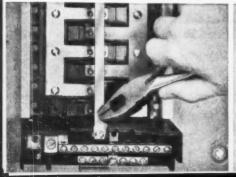


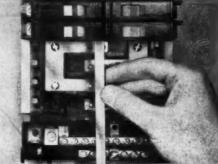
SIMPLEST, MOST FOOLPROOF N. I. SYSTEM BY FAR—NO SPECIAL TOOLS REQUIRED FOR INSTALLATION Simplified Safetybreaker system eliminates fussy keying systems, makes it impossible to incorrectly position tabs. Here's the Safetybreaker method:

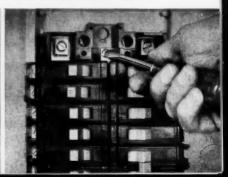
1 Simply tear off soft plastic spacers to loosen locking-bar screws, and let locking bar drop.

2 Plug in breakers in top portion of panel. Slide bar to top of panel.

3 Plug in remaining breakers. Tighten two screws to lock the NI system.









Why settle for an old-fashioned "basement gray" box?

## Get this new, smartly-styled safetybreaker...it doesn't cost a nickel more

(and often costs less!)

Here's a bonus in beauty and protection that gives you—and your customers—extra features at no extra cost.

**Modern appliance styling** lets you show how good your wiring job is. This soft sandalwood finish *belongs* upstairs, convenient to the kitchen, saving you on those heavy wiring runs.

Eliminates housewife confusion and saves you unnecessary call-backs. Simple as a light switch, with easy-to-see "on" and "off" positions. There is no tripped midposition to harass the homeowner, no calls for you to reset the breaker because the housewife mislaid or misread instructions.

Inside as superior as the outside. Won't rust, won't corrode because every

operating part is either stainless steel or heavily plated. Double protection with magnetic trip for short circuits and bimetal trip for sustained overloads. Easier to install with plenty of wiring room, no knuckle-skinning wire guides.

Want to know more about Cutler-Hammer's New Safetybreaker? Write for free 36-page Safetybreaker Selection Guide. Better yet, see your Cutler-Hammer distributor and let him show you personally.

#### What's new at Cutler-Hammer?

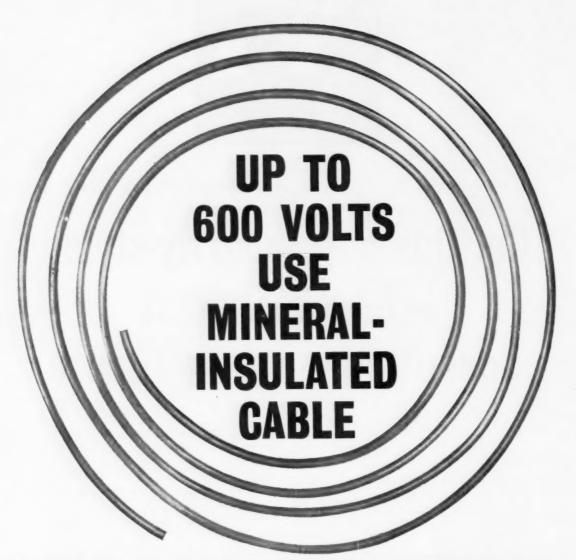
This new Safetybreaker is typical of the better products you'll be getting from Cutler-Hammer . . . results of new engineering talent . . . new facilities . . . a new creative atmosphere at every level.

WHAT'S NEW? ASK ...

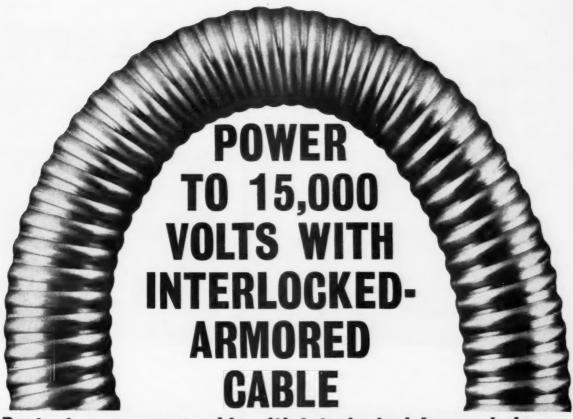
#### **CUTLER-HAMMER**

Cutter-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutter Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A





MI Cable, too, is flexible and needs no conduit for installation. MI's conductors are insulated with refractory mineral insulation, and protected by a seamless gas tight, liquid tight copper sheath. There's no danger from moisture, vapor, or heat with MI! An MI Cable job goes in fast, yet meets the highest possible standards of safety and long life. For up-to-600-volt jobs, you can't beat MI Cable.



Protect your power cable with Interlocked-Armor, indoors or out...for any above ground installation. Interlocked-Armored Cable is flexible and the contractor installs it without conduit or pullboxes. For service up to 15,000 volts—specify General Cable Interlocked-Armored Cable.

Be sure you get quality, economy and flexibility in your cable installations. Have your electrician or contractor specify Interlocked-Armored and MI Cable by General Cable Corporation, 730 Third Avenue, New York 17, N.Y.





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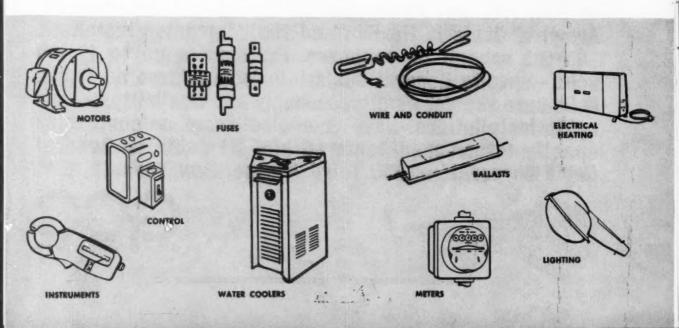
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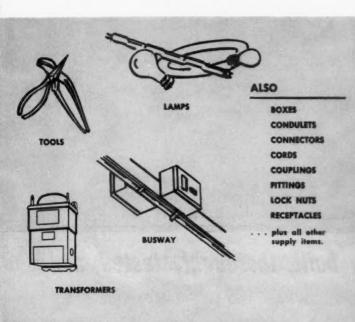


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transformers for every

Pole Type Transformers, Conventional and CSP

Specialty Dry Type Lighting Transformers

Power Transformers: Mineral Oil and Askarel Immersed Inert Gas Sealed Dry-Type Transformers

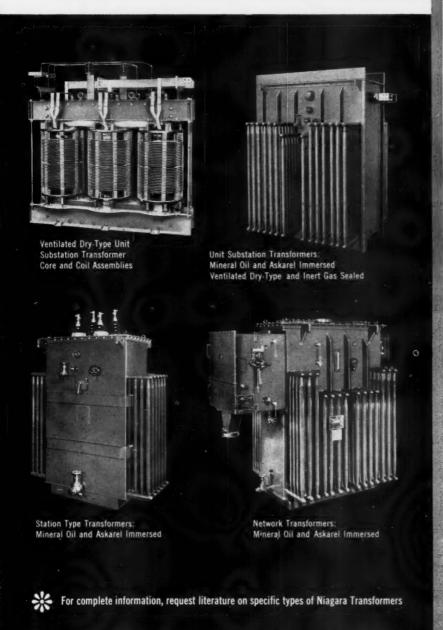
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Ventilated Dry-Type Transformers

carefully built, thoroughly tested, and

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UP TO 15,000 KVA



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Compression Type Raintight E.M.T. Connectors - Available in sizes: 1/2", 1/4", 1", 11/4", 11/2", 2"



Compression Type Raintight E.M.T. Couplings -Available in sizes: 1/2", 1/4", 114", 11/4", 2"



Snap-Strap for E.M.T .- Available in sizes: 1/2", %", 1", 14", 11/2", 2"



Blackhawk Offset E.M.T. Connectors - Available in sizes: 1/2", 34", 1"



Set Screw Type E.M.T. Connectors -- Available in sizes: 1/2", 34", 1"



Set Screw Type E.M.T. Couplings - Available in sizes: 1/2", 34", 1"

Blackhawk's Set Screw Type EMT Fittings are precision made of steel. Marge captive screws. Bright zinc finish. Truly the speed type fitting that contractors demand.

"Universal" two screw and locknut connectors. Available in sizes: %", 1/4", 14", 114", 11/4",



Watertite Connectors for Service Entrance Cable. Available in 1" and 34" sizes.



Non-Watertight Connectors. Available in sizes:



Service Entrance Elbow. Available in sizes: 1/2", %", 1", 14", 11/2", 2"



Slip Fitter Service Entrance Cap. Available in sizes: ½", ¾", 1", 1¼", 1½", 2", 2½", 3",



#### HOLDING DEVICES

#### SERVICE ENTRANCE MAST ASSEMBLY

Conduit Hanger. Designed to hold thinwall and rigid conduit. ¼" hole in the base permits use with toggle bolt, wood screw or anchor. Complete line of sizes.



Beam Clamp, Complete with case hardened set screw. Fits up to 1/2" thick beam flange. 1/4-20 tapped holes.



540 One Piece Box Support. Provides rigid, unified support. Easy to install. The first and finest.

560 Bar Hanger. Fastest, easiest, 010 neatest most economical way to hang all ceiling light fixtures. Available with or without fixture stud. Used between joists from 12" to 18" - 18" to 26". Made of heavy gauge steel. Adjustable to required spacing. No notch-

#### & ACCESSORIES



Offset Reducer.

Service Entrance Mast. Available for 11/4", 11/2", 2", 21/2",





Slip Fitter Head.





Mounting Bracket. Fits all size pipe from 11/4" to 3".



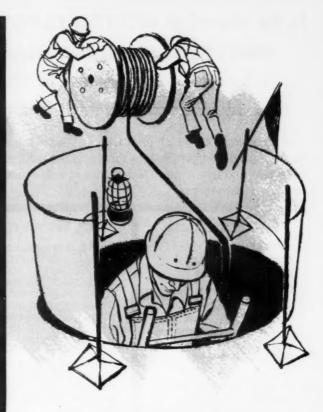
Immediate delivery from adequate stocks to electrical wholesalers only. Write today for Blackhawk's complete catalog of electrical fittings and specialties.



Blackhawk Industries, Dubuque, Iowa

Where the new ideas come from





## from small electronic wires

TO

multi-conductor high-voltage cables

#### HATFIELD HAS IT!

For every wiring need, Hatfield not only has a complete line of dependable wire and cable, but has it when you need it for immediate shipment where you need it. A local phone call in your area is all that's necessary to arrange overnight shipment of any size, type, color, or quantity from the more than 1500 items stocked by Hatfield's nation-wide network of warehouses and distribution centers. For over half a century, the electrical construction industry has known that for complete selection as well as quality and service... HATFIELD HAS IT!



#### ATFIELD WIRE & CABLE

DIVISION OF CONTINENTAL COPPER & STEEL INDUSTRIES, INC.
Plants: Hillside • Union • Linden / Executive Offices: Hillside, N. J.

1. MACHINE TOOL WIRE

2. CONTROL CABLE

3. PORTABLE POWER CABLE

4. ELECTRONIC & COMMUNICATION WIRE

SHIPBOARD CABLE

 INTERLOCKED ARMOR CABLE

 HIGH VOLTAGE POWER CABLE

HIGH VOLTAGE

What are your wire and cable needs? Circle the numbers that correspond to your requirements and the illustrations at the left...or let us know your special needs. Hatfield has it and will send the data immediately.

1 2 3 4 5 6 7 8 other\_\_\_\_\_\_

1 2 3 4 5 6 7 8 other\_\_\_\_\_

ADDRESS\_\_\_\_\_\_\_STATE

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#### ... we offer a complete line of improved MEGGER® Insulation Testers

Even the great corps of electrical men who have known and depended on Megger Testers for as long as 50 years will find important and useful new refinements in these most sturdy and reliable of instruments.

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RECTIFIER-OPERATED
DUAL-OPERATED
TWO-VOLTAGE

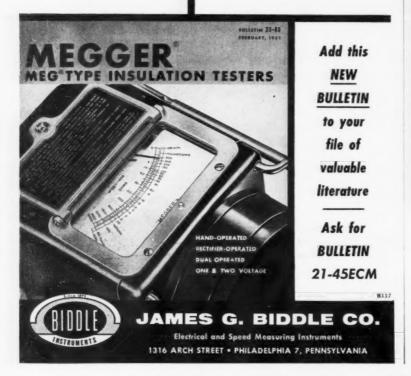
Megohm scale  $\div$  1 and  $\div$  10, Ohm scale and Capacitance Discharge on one selector switch or the basic megohm scale only.

Ranges from 0-20 to 0-10,000 megohms, at voltages of 400 to 1000 volts d-c. Ohm scales from 0-10,000 to 0-100,000. One model with 500 and 1000 volts d-c in one instrument.

#### Use them with confidence

These compact, conveniently portable instruments have earned popular acclaim from electrical men everywhere—the men who keep plants operating and production lines moving. These are the men who also keep profits from becoming losses.

A minimum of experience is required to use a Megger Tester and interpret its measurements. The few practical suggestions clearly and simply stated in the well known Megger Manual are all the electrical maintenance man needs to obtain accurate and reliable information for those test records of important production equipment.





Sold Through Recognized Distributors Only



ARRO EXPANSION BOLT CO.













3401 \*









136 \*

whatever your wiring device needs . . .

CIRCLE F devices give you everything you want—and you save money, too! High quality, low cost Circle F wiring devices provide fast, easy installation, trouble-free service and eliminate call-backs. Precision engineering and qualitycontrolled production plus rugged construction guarantee customer satisfaction. Circle F devices are available at Electrical Wholesalers everywhere for quick pick-up or delivery.





\*Only one of a complete line. For additional information, write for catalog.









864-SO \*



2632 \*

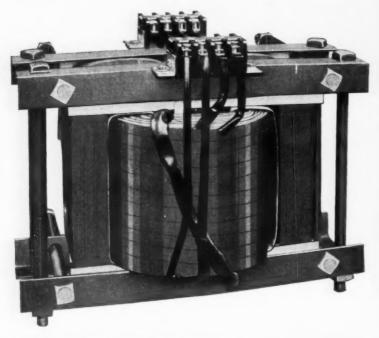


TRENTON 4, NEW JERSEY . For your wire requirements: Eastern Insulated Wire Corp., Box 591, Trenton, N. J.

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MID-SEPTEMBER, 1961

# DONGAN QUIET DRY TYPE TRANSFORMERS

Dongan has specialized in the manufacture of dry type transformers for more than 50-years. This length of service to the electrical industry assures you of high quality, dependable transformers. Carefully built to your requirements, they will give long, quiet service.



DONGAN DRY-TYPE TRANSFORMERS are made in both class B 80° Cent. Rise and Class H 150° Cent. Rise. Single phase transformers, 25 V.A. to 100 KVA; three phase, 3 KVA to 300 KVA. Suitable for indoor or outdoor applications. Designed for wall or platform mounting. All have roomy wiring compartments.

Sizes 5KVA and larger feature tap-changing and voltage-changing terminal board equipped with solderless connectors for speed hook-up. Built to meet or exceed NEMA specifications.

Dongan also makes transformers for-signaling-machine toolscontrol-back and boost-high voltage secondary for oil and gas burners-neon signs.

#### DONGAN ELECTRIC MFG. COMPANY

2980 Franklin Street

Detroit 7, Michigan

Telephone: LO-2-3974

# Here's why you get superior performance FROM FURNAS CONTROLS



feature advanced design for superior performance and longer life. Standardized design reduces parts inventory and provides quick and easy field modification.

- Dual Voltage 110-220 or 220-440 Volt Coils reconnectable on the job. Magnet features just one moving part.
- Non-tracking Contact Block is impact resistant. Completely visible and front removable silver-cadmium oxide contacts.
- Trip-free Thermal Overload Relays—manual or automatic reset. Third overload relay kit can be added in the field.
- Extra Switchlet interlocks for additional pilot circuits (up to 4) may be added to all starter sixes 0-4.





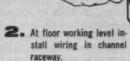
Drum Control

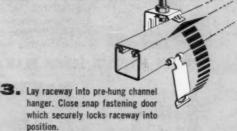
Write today for FREE Color Bulletin 14-B1, Furnas Electric Company, 1188 McKee St., Batavia, Illinois A76



Now...the fastest, easiest way to hang raceway

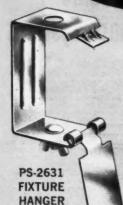
Suspend and align PS-2632 Channel Hanger from threaded rod at pre-determined level.





**POWER-STRUT** 

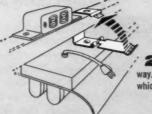
channel



PS-2632 CHANNEL HANGER

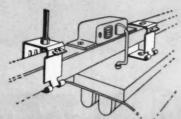
> ...and fluorescent fixtures...





2. Hook fixture over raceway. Close snap fastening door which securely locks fixture into position. Plug in fixture.

Complete installation in minutes. No screws, bolts or cotter pins to lose.



THIS FREE CATALOG

has 24 pages packed with money saving framing and electrical support ideas. Write for it today.



POWER-STRUT DIVISION . VAN HUFFEL TUBE CORPORATION . WARREN . OHIO

#### PAINE Adds A New, More Secure **Washer To Their Expanding Line Of Quality Products**



#475 Bar Joist Hanger Washer Is Ideal For Outlet Boxes, Clamps, Threaded Rods, Etc.

Paine's new washer is a simple, inexpensive and secure method for fastening all kinds of electrical devices to tubular or angle iron web joists. The new design prevents slipping, holds tighter because of "gripper" edges. Comes in two hole sizes, 1/4" and 3/8", packed 100 to a box. Contractororiginated, this new Paine product is a must for all types of industrial, or commercial building projects.

#### PAINE'S JUNIOR & SENIOR BEAM CLAMPS





Paine's Beam Clamps are ideal for securing conduits, switchboxes, pipes, and other electrical fastening or hanging devices onto "I" beams, ceiling channels, web joists, or building framework requiring lightweight, flushmounted fastening. Excellent for holding conduit pipe above false ceilings. Senior size features case-hardened, hexagon-headed, slotted cup-pointed screw head. Handles all heavy duty applications.

#### Try Paine's Liberty Conduit Clamp



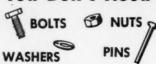
Designed for fast, secure hanging and fastening of thin wall conduit. One-piece unit has unique locking device. Eliminates need for nuts and bolts. Only standard electricians' pliers, screw-driver needed. Flat, smooth fastenerno sharp edges. Saves time and work.

THE PAINE COMPANY 61 Westgate Road, Addison, Illinois

the best craftsmen always ta



#### You Don't Need



#### or Special Tools to install



Power circuits...process tubing... piping...control cables...are better, faster, more economically supported with Chalfant engineered systems.

Exclusive crimp-type splice plates securely join Chalfant trays without the need of bolts, washers, nuts or pins. This is only one of the features that drops installation time way down over conventional installation methods.

Chalfant uses Aluminized steel to make Trays and Splice Plates. It's a high quality, longer lasting, stronger material that is outstanding in per-formance yet lower in price.

You'll be years ahead by specifying Chalfant Aluminized Steel Cable Racks for your jobs to...

15% on Material 40% on Installation





## CRESCENT



#### **Insulated Wires and Cables**

Pictured and described here are just a few of the many wires and cables that are made by CRESCENT.



#### ABC ARMORED CABLE

Has prefabricated breaking lines which make installing easie quicker and safer. A flattened bonding wire in contact with it underside of each convolution of the armor assures a permi-nent low resistance of armor.



#### SYNTHOL BUILDING WIRE-TYPE THW

Rated for 75° C operation in both wet and dry locations. Its smaller diameter permits greater carrying capacity for rewiring conduits with overloaded feeders.



#### BUILDING WIRE-TYPE RHW

Brad or Neoprene covered
Highest quality insulation, for use in both WET and DRY
locations at 75° C.



#### IMPERVEX TRENCHWIRE—TYPE USE-RR

Single conductors for direct earth burial. Has a heavy Neo-prene jacket over the rubber insulation, Provides low cost, per-manent underground cable installation.



#### STEEL TAPED PARKWAY CABLE

Designed for direct earth installation without additional pro-tection. All standard types regularly supplied and special type cables made to customers' specifications.



#### IMPERIAL PORTABLE POWER CABLE

Illustration shows Type SH-D 5000 Volt Trolling Cable for supplying power to electric shovels, dredges, etc. Covered with extremely tough Neoprene jacket.

#### 13/3 CRESCENT - TYPE UF - 12/3 CRESCEN

#### TYPE UF AND TYPE NMC

Used for direct earth burial as an underground feeder, als used for branch circuit wiring in damp or corrosive location



#### CRESFLEX

Most suitable, lowest cost for rural, residential and farm build-ings. Clean, gray paint finish.



#### SERVICE CABLES-TYPE SE

Both Style A (armored) and Style U (unarmored) are approved by Underwriters' Laboratories as service entrance cable and may be run down the side of a building without additional protection. It is tamper-proof, flexible and lightweight, moist ure-resistant and flame-retarding.



#### NEOPRENE CRESCORD

Heavy duty, oil-proof portable cord, Underwriters' Laborator-les Type 80,



#### HYVOLT SHIELDED POWER CABLE

For use on power circuits from 5 to 15 KV in conduits or for direct burial.



#### INTERLOCKED ARMOR POWER CABLE

Provides a flexible, metal-enclosed method of wiring for power.



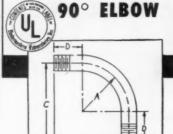
#### VARNISHED CAMBRIC LEAD ENCASED CABLE

Varnished cambric insulation has high dielectric strength and long life. Not affected by oils and greases. This cable is supplied with lead sheath for wet locations or weatherpress braid for dry locations.

#### CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, 5, N. J.

SIZES OF SPECIAL



in inches "C" end "D" unbent	radius "A"	offset stra	ight length "D" unbent	pipe size
------------------------------	------------	-------------	---------------------------	-----------

12"	1'9"	9"	3'0"	1"-21/2" inc.
15"	2'0"	9"	3'6"	1"-3" inc.
18"	2'4"	10"	4'0"	1"-31/2" inc.
24"	2'11"	11"	4'11"	1"-4" inc.
30"	3'5"	11"	5'9"	1"-5" inc.
36"	3'11"	11"	6'6"	1"-6" inc.
42"	4'6"	12"	7'6"	1"-6" inc.
48"	6'0"	12"	8'4"	1".6" inc.

Also available 45°, 30° and 60°. All are U.L. approved.

# Elbows



Conduit of Columbus elbows are U.L. approved. They are available in sizes ½" to 6". Sizes ½" to 2" are conveniently cartoned and all are shipped promptly from factory or from one of ten strategically located warehouses.

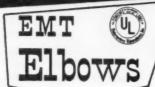




for convenient, money-saving connections

Conduit hot-dipped galvanized nipples are carefully threaded and chamfered, rigidly inspected and U.L. approved. Available in all sizes for ten strategically located warehouses. Sizes: ½" x close to 2" x 6" are all attractively packaged. Larger sizes 2½" to 6", in various lengths, also available.

# Specify these Columbus conduit fittings



# Couplings



#### for right-tight connections

Accurate tapping, careful chamfering and rigid inspection combine to give users completely satisfactory installations. Conduit Couplings are hot-dipped galvanized or black enameled . . . are available in all sizes from ½" to 6". Sizes ½" to 2" are conveniently packaged at no extra cost. Shipped promptly from factory or from one of ten strategically located warehouses.

### Running Thread



for any connection

Conduit running thread is furnished in convenient 3' lengths in three finishes: raw black, electroplated and hot-dipped galvanized. Your orders can be shipped promptly from the factory or from one of ten strategically located warehouses.

Sold only through recognized wholesalers





CONDUIT FITTINGS

GONDUIT PIPE PRODUCTS COMPANY -- COLUMBUS, OHIO

have

houses.

clear channels

contractors' costs.

Smooth raceways mean

quick installation without cable damage . . . reduce

Conduit E.M.T. Elbows are

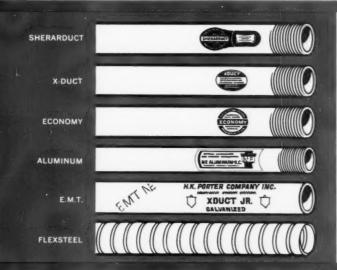
made in sizes 1", 1-¼", 1-½", and 2". They are U.L. approved. Conveniently

packaged at no extra cost. Shipped promptly from factory or from one of ten

strategically located ware-



# NATIONAL ELECTRIC is the Speedy way to PUT POWER IN PLACE



#### CONDUIT

National Electric Sherardized conduit is galvanizing at its best. Not just a dip, zinc is actually alloyed with the steel. In addition, NE conduit is available with the additional protection of MVC-1 poly-vinyl coating . . . in standard green plus *your choice of five colors!* All NE protective coatings are applied after threads are cut.

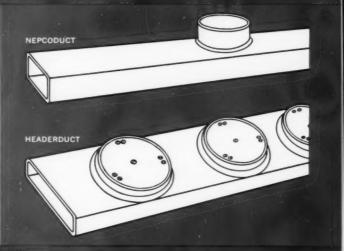
Conduit diameters: ½ to 6-inches. E.M.T. diameters: ½ to 2-inches. Flexsteel diameters: ¾ to 3-inches. Ask for Catalog 699.

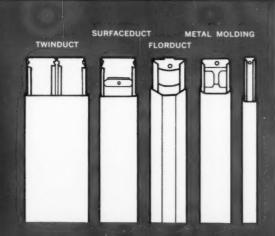
#### UNDERFLOOR RACEWAYS

Made in ten-foot lengths from 14-gauge cold rolled steel, NE underfloor raceways are zinc galvanized then coated inside and out with acid-resistant enamel. Outlets are spaced every 24-inches.

Designed primarily for new construction, Nepcoduct has a standard 1% x 2% inch cross-section. Flushduct is used primarily for modernizing existing buildings, by trenching the floor. Jumboduct, for industrial applications, has a 4 x 4 inch cross-section. Headerduct in 8′ to 10' lengths (1%'' x 7%'') is available for energizing cellular steel floors.

Ask for Underfloor Raceways Catalog 539 and Headerduct Catalog 700.





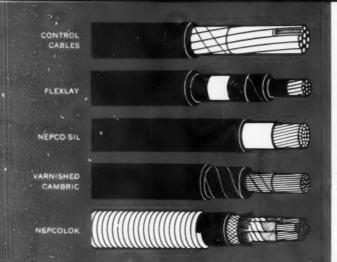
#### SURFACE RACEWAYS

National Electric's "lay-in" design eliminates fishing. Just mount the base to wall or floor, lay the wires in the base and snap on the cap. All types can be interconnected. Various cross-section sizes accommodate different number and sizes of wires. Trim contours blend with old or new surrounds. Complete line of fittings for a neat fit in minimum time.

Ask for Surface Raceways Catalog 707.



PLUG-IN STRIP



#### SPECIAL CABLES

For hundreds of special applications, National Electric makes power cables through 28,000 volts. Some are silicone rubber insulated, butyl rubber insulated, neoprene sheathed, plastic insulated or jacketed, polyethylene insulated or jacketed, shielded or unshielded, grounded or ungrounded, glass sheathed, asbestos-braid sheathed . . . for underground, underwater, duct or aerial use.

Ask for catalogs on each of these five types.

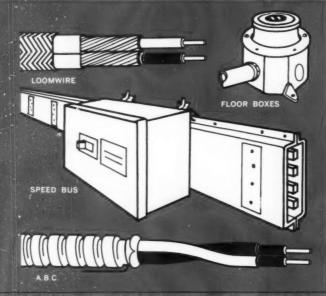
#### MINING AND WELDING CABLES

Mining Cables. Two, three and four conductor types, 600 to 8,000 volts. Neoprene or rubber sheaths. Round and flat-twin designs, grounded or ungrounded.

Welding Cable. Designed for maximum flexibility, with toughness and strength. Round design for minimum kinking and snarling. Neoprene sheath.

Ask for Catalog 702 and Welding Cable Catalog 716.





#### FLOOR BOXES, SPEEDBUS, A.B.C., LOOMWIRE

Standard or cast iron floor boxes accommodate the widest range of receptacles, including 2-wire and 3-wire, NEMA grounded, T-slot and twist-lock types through 20 ampere capacity. Large hand hole for easy fishing. Use with  $\frac{1}{2}$ ,  $\frac{3}{4}$  or 1-inch conduit. Full range of leveling adjustment.

National Electric's 100 ampere Speedbus has all the advantages of busway, at a cost equal to or less than conduit and wire. Conductors are  $\frac{3}{16}$  x  $\frac{7}{16}$ -inch heavily silvered aluminum bars. Each standard 10-foot length has 16 plug-in openings (8 each side).

Non-metallic, sheathed Loomwire for normal requirements, dry locations. Available with type TW conductors, with or without ground wire.

Armored Bushed Cable, 600 volt service conforms to Federal Specification J-C-71C.

Ask for Floor boxes Catalog 705 and Speedbus Catalog 698,

For more information, ask your Electrical Products Distributor, phone one of the numbers shown below, or write National Electric Division, H. K. Porter Company, Inc., Porter Building, Pittsburgh 19, Pa.



#### NATIONAL ELECTRIC DIVISION H. K. PORTER COMPANY, INC.

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#### RAPID REFERENCE CHART

SERIES	OPERATION	SWITCH	VOLTAGE	AMPS.	INTERMATIC QUALITY FEATURE
T 100	1 to 12 on-off per day	SPST DPST SPDT	125/250 volts	40	Standard ON-OFF switch.
T 170	1 to 12 on-off per day	SPST DPST SPDT	125/250 volts	40	Same as above, plus automatic skip operation on selected days.
T 180	1 to 12 on-off per day	SPST SPDT	125/250 volts	40	Each on-off period independently adjustable from 5 to 60 minutes.
T 960	1 to 96 on off per day	SPST SPDT	125/250 volts	20/15	Each on-off period in 15 minute units. Trippers permanently attached to dial.
C 8300	1 to 12 on-off per 12 or 60 min.	SPST	125 volts	15	12 min. cycle timings from 10 sec. to 11 min., 50 sec./60 min. cycle timings from 1 min. to 59 min.
T 500-R	1 to 12 on-off per day	SPST DPST	125/250 volts	55	Heavy duty standard ON-OFF switch. Up to 27,500 watts. Also available with "SKIPPER" feature.
T 1100	1 on-off operation per day	SPST	125 volts	15	Flush wall mounted standard ON-OFF switch to central districts in house or store. (LAMP • LYTER)

WRITE FOR FREE CATALOG OF COMPLETE INTERMATIC LINE



## THERE'S AN Ontermatic. FOR EVERY NEED!

Residential and Commercial Lighting Control • Air Conditioning Heating • Industrial Uses • Farm and Poultry Lighting • Signs Signal Bells, Buzzers, and Lights • Outdoor Installations Flush Mountings

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#### NEW INTERMATIC MODELS!

▼Two Trol SERIES V23000—Control two circuits independently or simultaneously by setting trippers for desired schedule. Ideal for apartment houses, signs, store interiors and window lights. DP-2 cir., 120/240 volts, 30 amps.

volts, 30 amps.

Astronomic Dial SERIES V25000 — ▶

Operates night lighting in relation to the rising and setting of the sun. No seasonal resetting is necessary. Recommended for store windows, neon signs, parking lolts, garages. DPST & SPDT, 120/240 volts, 40 amps.



#### INTERNATIONAL REGISTER COMPANY

CHICAGO: 2624 West Washington Blvd. . NEW York: 41-14 24th St., Long Island City



# RM

#### INDENTER FITTINGS and TOOLS

Here is the combination that is unbeatable when it comes to easier E.M.T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws.

A few more of the plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—
Extra heavy positive bonding locknuts—Smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall

thickness.



BM-51 BM-52 1/2" Offset Connector 34" Offset Connector



Red Report BM-21B 1/2" Connector



Red Beroat BM-228



Red Turoat BM-23B



BM-41 1/2" Coupling



BM-42 34" Coupling



BM-43



BM-21



BM-22



8M-23



BM-Na. 600 Changeable Jaw Indenter



BM-No. 1000 Handvise for ½", ¾" and 1" E. M.T



BM-No. 100 Cutter for ½", ¾" and 1" E. M.T.



BM-No. 607 ½" Indenter BM-No. 608 ¾" Indenter



All B-M indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.

# Now! Your choice of 5 lighting louver sizes - 3 shielding angles



45° SHIELDING

# WITH UNEXCELLED LIGHTING PERFORMANCE FOR TODAY AND ALL FUTURE HIGH LIGHTING LEVEL REQUIREMENTS

AMERICAN LOUVER offers 3 shielding medias—42°—45° and the all new 55° louver, for higher lighting efficiency and uncluttered appearance—they will meet your most rigid lighting requirements for individual fixtures, modules or complete louvered ceilings.

#### It pays to specify American

- \* PERMANENT COLOR STABILITY
- HIGH IMPACT FOR GREATER STRENGTH
- EASY TO HANDLE-LIGHT WEIGHT
- PATENTED INTERLOCKING LOUVERS
- ASSURE PERFECT ALIGNMENT
- LOW COST UPKEEP-EASY TO CLEAN
- AVAILABLE IN COMBINATION OF SIZES
- LOUVERS MAY BE CUT TO SPECIFICATIONS

MECHANICAL	Units	Fermulation HF 77-1040	ASTM
Tensile Strength Elongation at Break Modulus of Elasticity Hardness Fleaural Strength Deflection at Break Jensier Strength	Liss per equin Pervent In tension liss /sq in Rockwell Liss per equin Inches	6500-8000 1.8-2.4 4-5.x 10' M70-80 9000-13.000 0.15-0.35	D636-52T D636-52T D636-52T D785-51 D790-49T D790-49T
1½" x ½" Notched 1½" a ½" Gate End Notched 1½" a ½" Dead End Notched Machinga	Load It like per in of notch Load It like per in of notch Load It like per in of notch	0 25-0 35 0 60-0 70 0 30-0 40 Average	D256-47T D256-47T D256-47T
THERMAL			
Thermal Expansion Heat Distoction	In./in. per "C "F at 264 par % at 4000 per at 50 °C	6-4 x 10 ° 163-191	D696-44 D648-45T D621-51
Deformation Under Load	% at 2000 par at 50°C		D621-51
OPTICAL			
Light Transmission E 1040 Pigmentation 0.050° thick 0.100° thick 0.150° thick	Percent Transmission of 550 mu	52 38 29	
PHYSICAL			
Specific Gravity Mosture Absorption Burning Rate (0.050" thick)	Percent In /min	1 04-1 06 0 03-0 04 1	D792-50 D570-42 D635-44
RECTRICAL.			
Dissipation Factor Diefectric Constant Diefectric Strength Volume Resistristy	10' cycles 10' cycles Volta/Mil, ¼" thick Ohm/cm	0001 - 0005 2 45-2 65 400 10" "	D150-47 D150-47 D149-44 D257-52

Available in pastel colors

Louver size 29%" x 59%"; +0", -%" Cell opening %" x %" x %" high

55° SHIELDING

Louver size 2311/4" x 4711/4"; +0", -1/4" Cell opening "14" x "14" x 1/2" high

45° SHIELDING
2FT x 4FT SIZE
CHOICE OF TWO SIZES

Louver size 23%" x 47½"; +0", -%' Cell opening %" x %" x %" high Louver size 23%" x 47½"; +0", -%" Cell opening ½" x ½" x ½" high

42°SHIELDING

Louver size  $10\%'' \times 47\%''$ ; +0'', -%''Cell opening  $\%'' \times \%'' \times \%''$  high

For pertinent facts on American louvers, write for bulletin 33am and new 3 color catalog—

american louver company

5308 NORTH ELSTON AVENUE . CHICAGO 30, ILL.



5 to 23 kv cable splices to make?

# There's a

to simplify the job!

Splicing armored cable . . . non-metallic sheathed cable . . . lead-covered cable? There's a PLM Splicing Kit to simplify the job and insure correctly designed splices with a minimum of time and effort! Each PLM Splice Kit contains all materials needed for making one correctly-designed splice (including aluminum or galvanized steel casing), together with clear, step-bystep instructions for making it. Need for ordering or stocking many separate items is eliminated.

PLM Splicing Kits, complete with casings, are also supplied for making 3 and 4-way splices with armored cable. PLM kits and fittings are fully listed and described in PLM 52-page catalog 301. Write on letterhead for your copy.



3875 WEST 150th STREET . CLEVELAND 11, OHIO

Hoffman



#### ELECTRICAL ENCLOSURES

WALL MOUNTED, in 18 stock sizes. FLOOR MOUNTED. in double door or multiple door units -11 stock sizes.



JIC NEMA 12 PANEL

**ENCLOSURES** 

Ideal for housing electrical controls. components and terminal strips. Note removable mounting panel. Neoprene gasket on door protects against dust.

dirt, oil, water. Strong welded construction. No holes or open seams. Also available in NEMA types 1, 3, 4 and 5.



JIC WIRING BOX

Heavy gauge steel, welded seams. No knockouts or holes to

leak oil, water or dust. Neoprene gasketed cover with screw clamp makes tight oil-proof seal. Available with or without removable panel. 8 stock sizes from 4"x4"x3" to 16"x14"x6"

#### PUSHBUTTON **ENCLOSURES**

A complete selection of types and sizes. Fine quality con-struction and finish. Welded seams. Cover Welded seams. Cover has neoprene gasket. Holes take any standard oil-tight pushbutton. Types. range from "Standard" as shown, to Extra Deep, Slim and Pendent. For one to 25 pushbuttons.





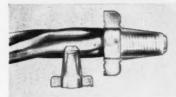
Perfect protection for control wiring. Neoprene gasket on cover and between joints seals out liquids and dust. Easy to assemble. Full length hinged cover simplifies wiring installation or modification after installation. Stock sizes: 2½"x 2½", 4"x 4" and 6"x 6" in lengths up to 10' with Elbows, "T"s, etc.

We also build enclosures to customer specifications

ENGINEERING MAM CORPORATION Dept. EPG-123 Anoka • Minn.

# Always In Stock

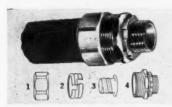
YOU GET IMMEDIATE DELIVERY FROM YOUR LOCAL DISTRIBUTORS OF THESE POPULAR IDEAL PLANT MAINTENANCE PRODUCTS



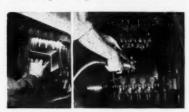
Built-in wrench. Unique wings make WING-NUT easiest wire connector to screw on heaviest branch circuit wires. Splice is visible inside tough nylon shell. U.L. listed for 600 volts as pressure cable connector, and 105°C. U.L. approved for aluminum and solid and/or stranded copper wires. 2 sizes of WING-NUT available to meet all pigtail splice needs.



Cut "fishing" time. Highest grade, oil-tempered flat spring steel FISH TAPES will not curl. Flexible and easy for long, multi-bend conduit runs. Steel reel holds tape, is handled with safe, sure grip and ends danger of bending, kinking or breaking tape. Used with flexible leader, solves 90% of fishing problems. 16" and 14" tapes in 50, 100 and 200 foot coils.



Vap-Oil-Tite—only completely reusable connectors for liquid-tight, flexible metallic conduit. Perfect seal. Positive ground, covers raw conduit end, fits EF and UA. U.L. approved. 90°, 45° and straight for ¾° to 4" sizes. Easy to apply: Slip ring nut (1), and split ring (2), on conduit. Screw grounding bushing (3) inside conduit. Tighten ring nut over connector (4).



In-place motor maintenance. Service commutators, motors without dismantling . . . use Ideal commutator resurfacers, brush seaters, flexible abrasives. All sizes and styles to fit any job. Ideal line also includes everything for commutator care: precision grinders, mica undercutters and many specialized small tools. See your distributor.



America's favorite! WIRE-NUT has long-proven performance record as lowest-cost method for all common branch circuit and fixture wire connections. Strongest, shake-proof wire joint possible. All 5 sizes U.L. listed as 300v fixture; large sizes 74B & 76B as 600v pressure cable connectors. Use WIRE-NUTS in all types of conduit, cable, non-metallic sheath and open wiring.



Easiest way around! Ideal PULLING ELBOWS & ADAPTERS make wiring around corners a snap. Precision milled of malleable iron for rugged strength and perfectly smooth pulling. Precise 90° fit. Cadmium plated, chromate treated. Supplied assembled, complete with rigid domed cover, full neoprene gaskets and BIG screws. ½" to 2" sizes, in three styles.



Vacuum cleaners and blowers. Blows dry air at high velocity but low pressure, so safe for delicate equipment. Light, balanced hand models for heavy, medium or light duty, complete with blower nozzle. Available with hand model or tank type cleaning attachments. Ideal CLEANERS do better job faster, at less cost. Universal type motor lubricated for life.



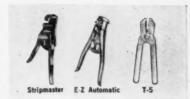
FREE MAINTENANCE PRODUCT CATALOG. You can obtain your own free copy of the complete Ideal Maintenance Catalog giving details on thousands of items you need for regular and special maintenance jobs. For free copy, send your name, company name, and address to: IDEAL INDUSTRIES, 1041-1 PARK AVENUE, SYCAMORE, ILLINOIS. Write today!



Select Set-Screw or Crimp. Only Ideal CRIMP has WRAP-CAP that insulates all around and even between wires. 600v U.L. approved for cadmium plated steel sleeve and vinyl 1-piece WRAP-CAP...now 2 sizes. 3 sizes of Ideal SET-SCREWS. All U.L. listed. Shell and connector easily removed and re-used. Tough shell has long skirt to prevent flash-over.

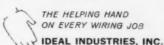


Double protection—Ideal VOLTAGE TESTER has a solenoid, calibrated indicator and a neon test lamp... each independent of the other. Safest, easiest for rugged daily use. Plastic safety yellow case, no-slip prods, prod storage space, fits pocket. Tests voltage, frequency, AC or DC, continuity, etc. Also model with resistor-fuses in prods to prevent arcing.



Strip wires fast and easy. "One-squeeze" STRIPMASTER strips both solid and stranded wire in 2 seconds. Heavy-duty E-Z AUTOMATIC cuts thru toughest insulation and strips wires clean without crushing ends. Low cost T-5 STRIPPER cuts, strips and loops wires. Fits flat in pocket. Strips 10 to 18 gauge. Many other special Ideal hand stripper models available.





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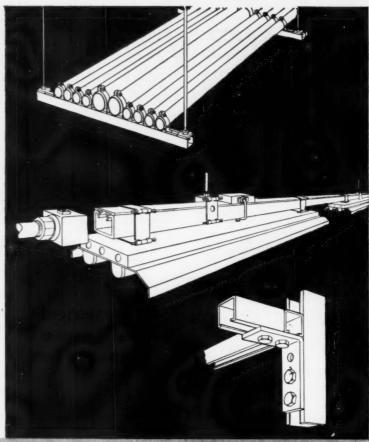
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GALV-KROM FINISH

An electrogalvanized finish
PLUS added protection of zinc chromate







Stab-lok® Load Centers



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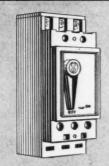


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Specify FPE for quality electrical control, distribution and power equipment—for residential, commercial, industrial and utility systems. Federal Pacific Electric Co., 50 Paris Street, Newark 1, N. J.



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**Rotary Handle Circuit Breakers** 



**Motor Controls** 



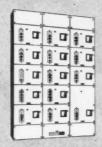
Lighting Panels



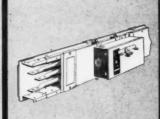
**Power Panels** 



Switchboards



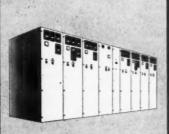
**Motor Control Centers** 



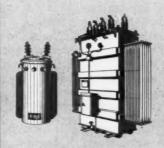
**Modular Bus Duct** 



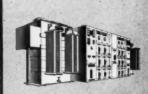
Metal-Enclosed LV Switchgear



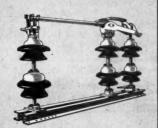
Metal-Clad HV Switchgear



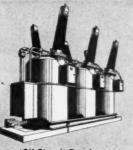
Distribution & Power Transformers



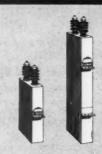
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growth through creative energy



Now, P & K lighting standards are available with this new approved mechanism — ideally suited for locations inaccessible to maintenance equipment or where such equipment is not available for any reason. Thus, to the maintenance free strength and beauty of P & K all-aluminum standards, you enjoy the economy and convenience of ground level relamping or service.

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The Original Klein Side Cutting Plier—Also available in NE (Streamlined) type. Cat. No. 201



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Electrician Conduit Piler—Reams inside and outside of conduit, tightens lock nuts in outlet boxes. Cat. No. 333-8

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COMBINATION TEE AND PARALLEL CONNECTORS

#### POWER CONNECTORS



T-CONNECTORS, TUBE



BUS BAR

# GROUND CONNECTORS

CABLE TO PIPE OR ROD 90° OR PARALLEL



CABLE TO

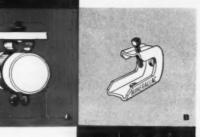
They're O. K. if They're O. Z.

#### WHY GUESS?

#### BE SURE WITH

#### "SIZE-MARKED"

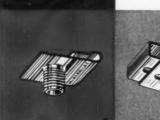
#### MINERALLAC METAL FITTINGS!



End time-consuming guesswork and costly mismatches in the stockroom and on the job with MINERALLAC Fittings with exclusive "Size-Marked" feature! Each MINERALLAC Hanger, Clip, Strap and Beam Clamp is clearly and individually stamped with its exact size for immediate identification and quick, easy handling. Where time is money, "Size-Marked" Metal Fittings help you save!

You'll enjoy a triple advantage when you specify MINERALLAC. Exclusive, "Size-Marked" time saving Economy . . . plus outstanding Service and fast Delivery which have made MINERALLAC famous with leading contractors throughout the world.



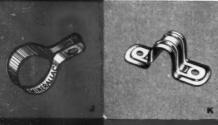
















SEND FOR LITERATURE AND PRICES ...

-Cable and Conduit Hangers. In Zinc-plated Steel and Everdur. All sizes. Insulated bushings available. Top quality. Permit quick wiring.

B. Steel Beam Clamps—for Mounting Hangers on I Beams. Mounts Mineraliac hangers No. 0 to No. 6 on I-Beams without necessity of drilling holes. Have 1/4-20 tapped holes. Fits beam flanges up to 1/2" thick. Low cost.

C. Heavy Duty and Medium Jiffy Clips—Made of heavier material. Has exclusive inverted rib, that provides more strength at the bend of clip . . . and, of course, adds the benefits of famous "Snap On" feature!

D. Scissor Clip-Two-piece clip for mounting Fixtures, Boxes or Conduit Hangers to 1-inch T-Bar. Easy to install and locks in place.

E. Min-A-Clip—The most efficient and economical method available for installing Conduit or Pipe on Bulb Tee Irons of "Poured Gypsum Deck Type Roofs". Hanger turns on rivet, eliminating many bends.

F. Stud Clip and Fixture Stud Clip— For mounting 8B or 1900 Outlet Boxes or hanging Fixtures on Bulb Tee Irons. Fixture Clip available for either pipe or rod.

G. Two-Piece Stud Clip—For mounting Fixtures, Boxes or Conduit Hangers Tee Irons on Beams heavier than 1inch T-Bar. Fits flanges 1%" to 2%" width, up to 1/4" thick.

H. No. 100 "Pull-In" Compound—For Rubber, Synthetic, Plastic or Lead-Covered Wires or Cables. Approved by Underwriters' Laboratories for lubricating wires and cables to facilitate pulling them into conduits. Not injurious to wire or covers. Available in pint, quart, 1/2-gallon, gallon and 5-gallon cans.

I. Insulating Compounds-A dependable line of insulating compounds for use in Cable Joints, Potheads and Terminal Bells. Eight types for various voltage, temperature and climatic conditions.
Also Oil Insoluble Compounds. Available in ½-gallon, 1-gallon, 2-gallon, 5-gallon and 50-gallon drums.

J. Ring Hangers—For supporting cable, conduit or pipe. Stocked in sizes from ½" to 2". Can be used in combination with Mineraliac Perforated Strap. Zinc-Plated Steel. Special sizes available on request.

N. I Wo-Hole Pipe Straps—For calle, conduit and pipe. Available in Zinc-Plated Steel or Everdur for sizes from ½" T. W. to 1" I.P. Available in Zinc-Plated Steel only for sizes from 1½" T. W. to 6" I. P.

L. "Minny-Twist" Hangers-Supports pipe and conduit. Install with screw or bolt. Hang conduit in hanger. Insert tongue in slot and twist with closing wrench.

MINERALLAC Electric COMPANY

ESTABLISHED 1894 25 NORTH PEORIA STREET CHICAGO 7, ILLINOIS

# Choose from the leading line-



#### REDUCE OUTDOOR LIGHTING COSTS

Specify the Original



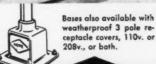
#### MALLEABLE IRON METAL PIPE POLE BASE

Attractive, rugged lighting poles easily field-fabricated by combining Haps threaded bases with standard conduit or pressure pipe. Four base sizes permit your fixture and elevation selection for a limitless variety of installations. Base hubs tapped deep for strong, locking engagement with threaded pipe. Ample chamber for stubbing conduit, splicing, grounding.



H42200 2" H42250 21/2" H42300 3" H42400 4"





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#### THE LARGEST SELECTION OF CAST IRON BOXES

HOT DIPPED GALVANIZED

92 sizes



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NEMA VII CLASS I GROUP D

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FLUSH MOUNTED NEMA IV WEATHERPROOF



SIDEWALK BOX WITH



H3200 138 sizes HINGED COVER. WITH WING NUT CLASPS, RETAINED GASKET



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17 sizes TERMINAL CABINETS FOR THERMOCOUPLES OR CONTROL

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H2200 134 sizes

OVERLAP

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172 sizes

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H6000 S

HAZARDOUS LOCA TIONS, 30, 60, 100, 200



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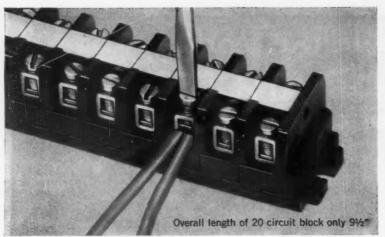
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Completely illustrated . Full dimensional and technical data



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Buchanan has this . . . and more. No terminals, no lugs, fewer wiring problems when you use Buchanan sectional MD pres-SURE-blocks with tubular contacts. And, you can group more common wires—equal to 1 #22 thru 1 #8-under a single contact. Just 2 different snap-fit parts build any length Buchanan MD block . . . with more "wanted" features than conventional blocks. Strap screw contacts also available. Write now for Bulletin EC-9

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Put the light where you want it and it stays there—no sagging or slipping. Eliminate costly repairs and lost time with these fixtures that stay on the job and out of the repair shop

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SILENT

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5002 5003

#### QuieT

Combines effortless toggle action with positive current control.



5011 5012 5013



5014

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for Specification Grade devices

	SILENT MERCURY SWITCHES		Quiet SWITCHES*			
	1155	10000	15 AMP		20 AMP	
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Single Pole	5001	5001X	5011	5011X	5051	5051X
Double Pole	5002	5002X	5012	5012X	5052	5052X
Three-Way	5003	5003X	5013	5013X	5053	5053X
Four-Way	5004	5004X	5014	5014X	5054	5054X
Sie ve-Lite with glowing toggio						1
Single Pole	5005	12	-	-	-	
Three lay	5006	-		-		-

RATINGS	3055	NEW YEAR
125V "T"	250V	120V, AC
104	EA	164

RATINGS

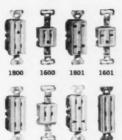
120—277V, AC
\*Key operated types
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#### SIERRAPLEX

First major design improvement in years! These distinctively styled receptacles are complemented by a full line of matching wall plates. Specification Grade. Meet all existing codes and standards.







		TANDEM SLOTS 15A-250V	
IVORY	BROWN	IVORY	BROWN
1600	1600X	1601	1601X
1800	1800X	1801	1801X
15A 125V	-250V	1850	1850X
1500	1500X	28-50	-
1700	1700X		15-
		1000	1353
1602	1602X	1603	1603X
1802	1802X	1803	1803X
15A 125\	7-250V	1852	18523
1502	1502X	DO HOU	-
1702	1702X	-	-
1900	1900X	3043	-
1901	1901X	17	2-
1902	1902X	-	20-
	15A 1600 1800 15A 125\ 1500 1700 1602 1802 15A 125\ 1502 1702 1900 1901	1600 1600X 1800 1800X 15A 125V-250V 1500 1500X 1700 1700X 1602 1602X 1802 1802X 15A 125V-250V 1502 1502X 1702 1702X 1900 1900X 1901 1901X	15A-123V   15A   15A-123V   15A   100

#### SIERRA

Conventionally styled, this popular line offers same high quality and craftsmanship as Sierraplex. Features include 2 grounding screws on 3-wire types, handy wire strip gage, and break-off strip for 2 circuits.





1500





	Section 2	BIO SEC	122745	PRINCIPE.
BACK AND SIDE WIRED				
Single Grounding-Type 3-wire	1200	1200X	1201	1201X
Duplex Grounding-Type 3-wire	1400	1400X	1401	1401X
Comb. Duplex Grdg-Type 3-wire	15A 125V	250V	1450	1450X
Single Convenience 2-wire	1100	1100X	-	10 to 1
Duplex Convenience 2-wire	1300	1300X	ALEXE !	
SIDE WIRED				
Single Grounding-Type 3-wire	1202	1202X	1203	1203X
Duplex Grounding-Type 3-wire	1402	1402X	1403	1403X
Comb. Duplex Grdg-Type 3-wire	15A 125V	-250V	1452	1452X
Single Convenience 2-wire	1102	1102X		DE HOS
Duplex Convenience 2-wire	1302	1302X	2 200	100-

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Choose from world's most complete line! Over 5000 wall plates in Plastic, Brass and Stainless Steel; and in a variety of styles, colors, finishes, combinations and gangs.



STAINLESS

"S" LINE



BRASS

"B" LINE





PLASTIC "D" LINE

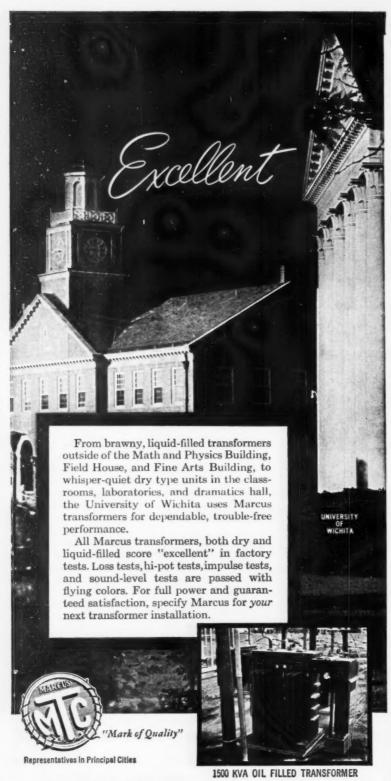
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Leadership through craftsmanship



# MARCUS TRANSFORMER CO., Inc.

A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA

# Save Time, Money Speed Installations with . . .

P-W
CABLE SUPPORTING
SYSTEMS



P-W's TYPE "E" (PUNCHED BOTTOM) TRAYS—FOR POWER AND CONTROL CABLES AND INSTRUMENT TUBING—ALTHO LESS EXPENSIVE, ARE STRONGER, VERSATILE AND SUPERIOR. CONTROL CABLE CAN BE DROPPED OUT ANYWHERE.

Engineers, Contractors and Installers look for QUALITY, LONG LIFE, AND LABOR SAVINGS in their supports. That's why more and more users are turning to P-W. Among our outstanding improvements are: CONNECTIONS that are quick and easy to install—PRE-CUT SYSTEMS saving installation time—EXTENSION CONNECTORS eliminating field cutting to complete runs—ADJUSTABLE HORIZONTAL and RISER CONNECTORS to go over, under or around pipes, trusses, columns, etc. — BUILT-IN ADJUSTABLE DROP-OUT SECTIONS eliminate cutting out bottom of tray—STRAIGHT SECTIONS available in lengths up to 16' (33\frac{1}{3}\frac{1}{3}\text{less connectors and less installation time over 12' lengths).

P-W SUPPORTS are available in hot dip galvanized steel or aluminum, in LADDER, EXPANDED METAL and SOLID TRAYS in addition to Type "E". All systems are interchangeable. Write for

Catalog 858-A.

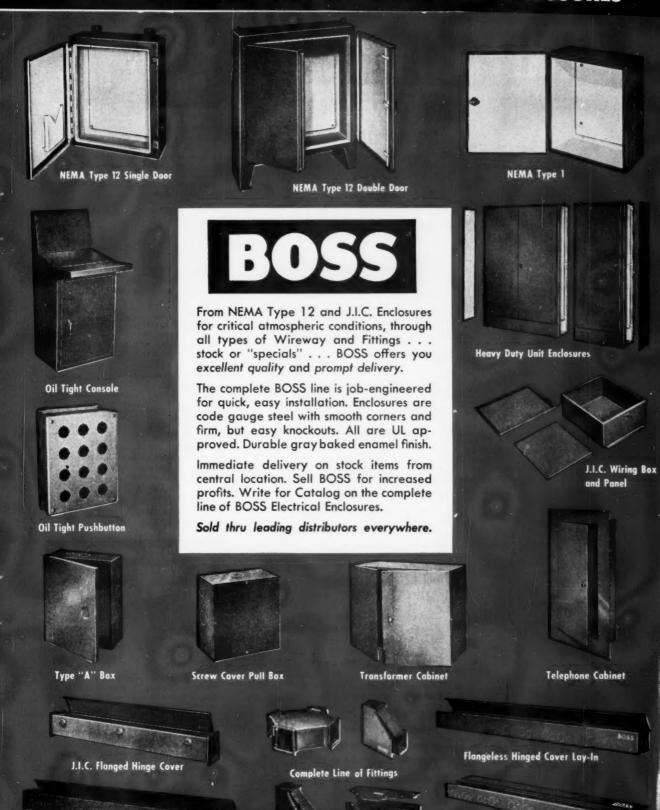
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BOSS

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**ENGINEERED PRODUCTS DIVISION** 

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Flangeless Screw Cover

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Multi-Circuit Cycle Timers



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Our Bulletin A-17 also includes

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17 styles and 1157 sizes available in cast iron, aluminum, brass and bronze alloys. Spring City offers the greatest number of box styles, and the greatest number of box sizes than any other company in the electrical field. 1960 catalog available. Representative styles illustrated below.



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Surface mounted, 160 standard sizes plus others

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TYPE FF

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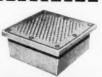
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Flush mounted, 53 standard sizes plus

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CAST IRON CAST **ALUMINUM** 

Type EX boxes meet N.E.C. requirements for Class 1, Groups C & D hazardous locations. Standard construction includes extra-thick walls, highly machined flanges, great number and close spacing of cap screws, and minimum of 5 full thread conduit entrances. 112 standard sizes plus others. Made to Underwriters and Military Specifications.

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Typical standard construction up to 71/2 Kva.



10 — 75 Kva standard transformer, interchangeable wall or floor mounting.



300 Kva three phase transformer, standard enclosure.

Popular types and sizes up to 75 Kva, single and 3-phase, are in factory stock, and shipped same day order is received.



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Up to 10,000 Kva. Up to 15,000 volts

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Sorgel Unit Substations, incorporating Sorgel load center transformers, are available with any type or make of Switchgear.



500 Kva standard enclosure, temperature equipment, and oil fuse cutouts mounted on top.



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- All sizes with and without ground wire.
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Conduit expansion fittings by Spring City relieve the strain of expansion and contraction in long runs of conduit. Applications: Strains caused by temperature changes, expansion joints in structures, and expansion joints in concrete. 1960 catalog available.



TYPE AF for rigid conduit. Allows 4" expansion and contraction.



TYPE EF for rigid conduit. Allows 8", 12" or more expansion and contraction.



TYPE TF for thin wall (EMT) conduit.
Allows 4" expansion and contraction.

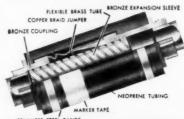


for rigid conduit terminating in box. Allows minimum of 4" expansion and contraction.

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34" movement in all directions.

30° angular deflection from the normal in any direction. Vibration damper between sections of conduit.

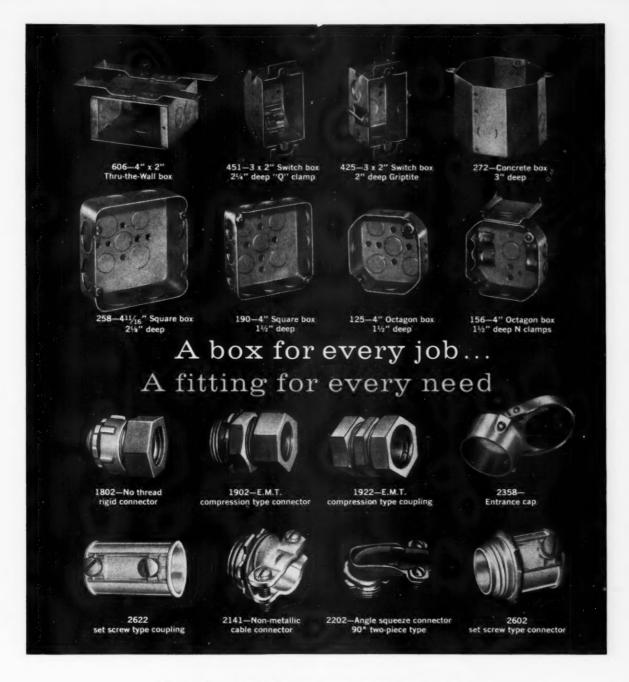


STAINLESS STEEL BANDS

SPRING CITY ELECTRICAL MFG. CO.

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Raco has the most versatile and complete line of roughing-in material you'll find anywhere. Shown here are some representative products of our extensive line. One thing is sure—whatever size, whatever type of box or fitting you require, Raco has it.

And, of course, when it comes to quality, anyone who has used Raco roughing-in materials will tell you, "there are none finer".

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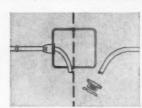


#### BUCHANAN pres-<u>SURE</u> Romex Connectors.. EASIEST, FASTEST TO USE



Just One Piece To Handle. Insert the pres-SURE Romex connector in the knockout, hold firmly against inside of box, give initial crimp with electricians' pliers, then complete crimp with 2 hand-squeeze. No screws, lock nuts or clamps. One Man Completes Job First Time Around. Only pres-SURE Romex connectors can be inserted in boxes after wires have been run through knockouts. One journeyman can pull wires, install connectors, cut wires to proper lengths, staple wires close to boxes. No wasted wire, no time lost.

More Wiring Room Too—this connector extends less than 3/64" into the box. Insulation abrasion is minimized. Permanently tight, vibration-proof connections are assured. No parts to work loose; can't rust. Write for bulletin EC-9



Listed for 14/2, 14/3, 12/2, 12/3, and 10/2 non-metallic sheathed cable. Catalog No. 1050—An exclusive Buchanan product (U.S. Patent 2527227). %" trade size fits standard ½ knockouts.







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38 Standard sizes to house oil-tight push-buttons.

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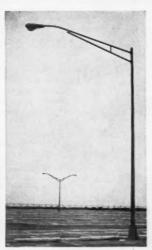
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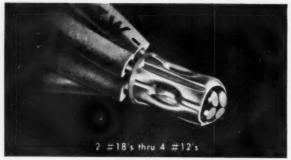
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#### SPLICE



#### Without WIRE TWISTING

Buchanan's 2008S Steel Splice Caps splice 2 #18's thru 4 #12's better than ever. They won't pull, twist or shake off . . . even on untwisted wires. Crimped with Buchanan's C24 pres-SURE-tool, the 2008S clamps conductors in a vise-like crimp. Its exclusive fluted design strengthens the cap, helps to position it in the tool. When the 2008S Splice Cap is crimped, the flutes confine the conductors into a tight area . . . intimate wire-to-wire contact. There are no voids. This eliminates looseness. You insulate completed 2008S splices with Buchanan's 2007 Snap-On Nylon Insulators. They go on with a snap; provide quickest insulation . . . even on fine wires and in the coldest weather. Write for Bulletin EC-9



Splice caps listed as "pressure-type wire connectors" and "fixture-type splicing connectors" for 2 #18 thru 4 #12's. Insulators UL and CSA listed for 600 v. on building wire and 1000 v. in fixtures, in applications up to 105°C. (221°F.). Also U.L. listed for 1000 v. in electric signs.





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The "Tru-Level" is an adjustable steel box with a 31/4" diameter brass cover plate. There are two 1/2" and two 3/4" KO's in sides and two 3/4" and three 1/2" KO's in bottom. Four 1" side KO's available. Come in two standard heights 31/8" and 25/8" for power and telephone.

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  Never greasy or messy.
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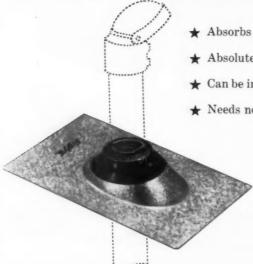
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New Products from Arrow Conduit help you keep pace with modern wiring needs.

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The Only Conduit Bender on the Market that will not Slip, Kink or Mash the Conduit

# New! Improved SILVEY

**Excellent for Steel, Aluminum** or any Standard Conduit

The reason is in the groove. It is so designed that the pressure in bending is on the sides, leaving the top of conduit free from any pressure so that it can contact in process of bending, which prevents kinking and slip-ping. Just compare its bending performance against any other bender.

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**PRICES** 

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.compact, easy to handle, deep-cut threads, weather proof!

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... complete line for 1/4" to 4" pipe. Three types cover all connections.

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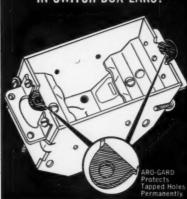


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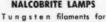


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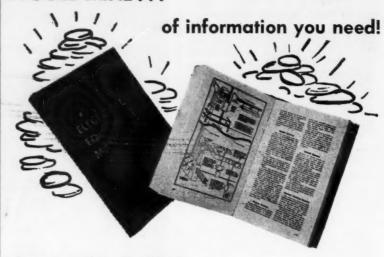
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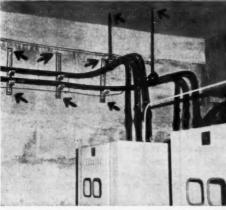
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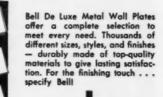


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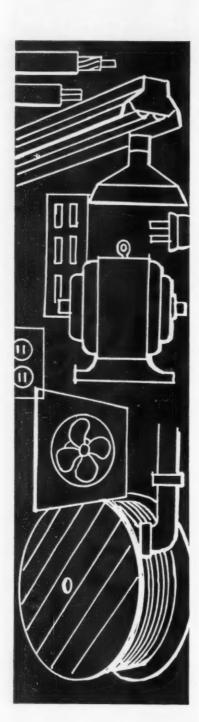
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# PRODUCT DIRECTORY



Classified listings of manufacturers of electrical products

Products in this section are arranged under the following 12 major sections:

- 1. Power Transmission Line Equipment
- 2. Transformation & Conversion Eqpt.
- 3. Switching & Control Equipment
- Protective Equipment
- 5. Wiring Devices & Boxes6. Conductors & Connectors
- 7. Raceway
- 8. Motors & Generators
- 9. Lighting Equipment
- 10. Signal, Communication & Indicating Eqpt.
- 11. Heating & Cooling Equipment
- 12. Tools & Supplies

Each of these sections is further broken down into individual classes of equipment. For example: Section 1, "Power Transmission Line Equipment," includes (A) CONDUCTOR SUPPORTING STRUCTURES, (B) LINE TRUCKS & MOBILE EQUIPMENT, (C) MANHOLE EQUIPMENT, and (D) POLE EQUIPMENT.

Where applicable, these classes are further subdivided. CON-DUCTOR SUPPORTING STRUCTURES, for instance, include (1) Crossarms, (2) Poles, and (3) Towers. Companies manufacturing crossarms would be followed by a (1) in parentheses; those manufacturing poles would be followed by a (2); those manufacturing both would be followed by (1-2), etc.

The symbol (•) indicates that detailed information concerning the product may be found on the page indicated after the listing.

#### **Technical Literature**

Manuals, bulletins and other reference material on electrical products are listed following each of the twelve product classifications of the Product Directory. They may be obtained without cost or obligation by filling in the requested information on one of the Free Information cards on page 163.

# PRODUCT INDEX

Manufacturers of equipment and materials normally used in electrical construction, plant operations and motor service work are listed in the Product Directory beginning on page 138. To find any specific product in this directory, locate the product first in the comprehensive alphabetical index below.

For example, this index shows "Cartridge fuses" to be listed under 4B. Turn to Section 4 and find "Cartridge fuses" as number 1 under "4B. Fuses". Companies listed under "Fuses" which are followed by the bracketed number (1) make cartridge fuses. Bold-face listings refer to advertising pages containing additional information.

Adapter removers, fuse	Beam clamps	Cable aplices & splicing equipment Cable tags Cable tags Cable-to-cable connectors Cable tracers Cable tracers Cable trays Cable wire & cord. 6A, B, C, D Cable & wire supports 1C, Caps. supports 1C, Cartridge heaters 1C, Cartridge
	Bearings, motors & generator 12P	Cable tags
	Bed lamps9A	Cable ties
Adapter removers, fuse	Rolls 100	Cable-to-cable connectors
Adapters, conduit bushing	Bench lights9E	Cable tracers
Adapters, grounding	Benders, conduit & EMT12C	Cable trays
Adhesive labels	Benders, metal	Cable, wire & cord
Adjustable floors7C	Rending gages 12C	Cable & wire tools
Agitator-drive motors8D	Bending machine pumps12C	Cable wrapping
Air conditioners11E	Bevelers, pipe12C	Calling systems
Air handling equipment	Bin level indicators	Cambric insulation
Air ionizers11F	Birs, parts storage 12D	Canvas, varnished
Air purifiers	Bins, truck	Capacitor aging testers
Aircraft motors	Bipost sockets5C	Capacitor protective gaps
Airport lighting9D	Blanks, knockout	Capacitors, fluorescent lamp circuit
darms10B, D, E	Blocks, connecting	Capacitors, power-factor correcting
darms, burglar	Blocks, fuse4C	Caps, attachment
larms intrusion 10D	Blocks, terminal6F	Caps, service entrance
lloy conduit7D	Blowers portable 191	Carbon brushes
illoys, brazing12V	Blown fuse alarms10B	Carrier system controls
Ilternators8G	Bobbins, coil	Cartridge fuses
Aluminum Conduit	Bodies, conduit7E	Cartridge heaters
Aluminum fittings7E	Bodies, cord connection5B	Catenary supports
mmeters	Boilers, steam (electric) 110	Cathodic protection cable
implifiers, magnetic	Bolt-sealing compound	Cathodic protection equipment
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Analyzers, system10C	Boring tools, hand 191	Cellulose acetate tane
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Anchors, pole line	Box hardware5E	Cement, insulating
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Appliance wire & cable	Brackets, transformer mountingZA	Channel, cable-supporting
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Armature banders	Bridge lamps9A	Church lighting
Armature fields	Bridge lighting	Circle cutters
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Arbestos coment conduit	Brush plating equipment	lamp
Asbestos insulation	Brush seaters	Circuit-breaker testers
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and a second sec	Bushings grounding	Clay duct dowel pins
	Bushings, insulating	Cleaners vacuum
	Bushings, motor	Cleaning compound
	Bushings, sealing7E	Cleats, wire & cable
D	Bushings, strain relief	Climbing equipment
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Sanding, armature	•	Clutches, electric
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Bars, commutator	Cabinet convectors	Coiled cords
Bars, tamping12A	Cabinets, equipment enclosing	Coils, motor & generator
daseboard electric heaters	Cabinets, parts storage12D	Coils, solenoid & magnet
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Bases, motor & generator 190	Cable connectors	Collecting rings & shoot
Bathroom heaters	Cable drive-rings	Color-coding tape
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	pay out recie of turnicables 14A	Communator para consensations
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Bags, tool   12A	Cab heaters         11A           Cabinet convectors         11A           Cabinets, equipment enclosing         5F           Cabinets, parts storage         12D           Cable         6A         6E           Cable benders         12B           Cable connectors         5E, 6F           Cable drive-rings         6G           Cable duct shields         1C           Cable, electric heating         11A           Cable hangers         1C           Cable locators         10C           Cable locators         12A           Cable pay-out reels & turntables         12A           Cable pay-out reels & turntables         12A           Cable paics         1C           Cable sealing compound         1C	Commutator cement

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D	Explosion-proof boxes 5D Explosion-proof circuit breakers 4D Explosion-proof hand lamps 9E Explosion-proof heaters 11A Explosion-proof lighting 9G	Gaskets, conduit fitting7E Gasoline-engine-driven generating sets8F
Dashpots3H	Explosion-proof heaters	Gas tube sign cable. 5D Gas-turbine generators 8F Gaseous-discharge lamps 9F Gaskets, conduit fitting 7E Gasoline-engine-driven generating sets 8F Gate & door openers. 3J Gear installers & extractors. 12J Gearmotors 8D
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Hammer-actuated tool fasteners12K Hammers, electricians' 12L	J	Machine accessories         12M           Machine lights         9E           Machine process controls         3K           Machine tool cable         6D           Machine tool transformers         2B           Machines, soldering         12H           Mapric coils         12V
Hammers, electricians   12L	Jacks, cable-pulling         12B           Jacks & jack screws.         12D           Jacks, pole line.         12A           Jumpers, insulated         12A           Junction boxes         5D           Junction boxes, pole base         5D	Magnet generators         8E           Magnet wire         6D           Magnetic amplifiers         3K           Magnetic brakes         3K           Magnetic contactors & starters         3M           Magnetics         12J           Magnetos         10K           Magnetos         10K           Maintenance         12D           Maintenance         12C           Manhole         20K           Manhole         21C           Manual starters         2M           Marine lighting         9D
Heads   Service   12F	Kettles, melting	Marine motors         8D           Marine wire & cable         6D           Markers, conduit         7E           Markers, pole         1D           Markers, wire & cable         12V           Masking tape         12R           Maskin, face protective         12W           Masoury anchors         12K
Heaters, soldering gun or iron. 12H Heating cable 11A, 11C Heating controls 3J Heating elements & devices 11C Heating transformers 2B Heavy-duty switches 3H	Kettles, melting         12J           Key-operated switches         3H, 5A           Killowatt-hour meters         10A           Kits, cable-aplicing         6F           Kits, motor encapsulating         12U           Knife switches         3G           Knives, cable sheath-splitting         12B           Knobs, wire & cable         6E           Knockout blanks         1E           Kraft papunches         12C           Kvaft papunches         12Q           Kva meters         10A	Masonry drills  Master antenna systems 10F  Masts, service entrance 7E  Mat-operated switches 3H  Material pricing service 12X  Materials handling equipment 12D  Mats, floor, heated 11A  Mats, mow-melting 11C
Hermetic motors	L	Mats, switchboard         12U           Measurers, conduit         12C           Measurers, wire         12B           Mechanical rectifiers         2C           Mechanisms, switch-operating         3J           Melting pots         12J           Mercury control switches         3H           Mercury light switches         5A           Mercury-turbine generators         3F           Mercury-vapor fixtures         9C
Hoist motors	Labels, adhesive         .12N           Laboratory         .3C           Lacing hooks         .12D           Lacing twine         .12V           Ludders         .12A, 12D           Ladders, conductor-supporting         .6F	Metal benders
Holders, lamp   5.0     Holders, lamp   5.5     Holders, lamp   industrial   5.5     Holders, soldering gun & tool   12A     Holders, tool   12A   12L     Holders, tool   12A   12L     Holders, tool   12B   12F     Hooks, lacing   12F     Hooks, lacing   12F     Horns   10G     Hospital signals   10F     Hospital signals   10F     Holders   10F     Hospital signals   10F     Holders   10F     Hospital signals   10F     Holders   10F     Holders   10F     Holders   10F     Hospital signals   10F     Holders   12B     Holders	Ladders     .12A, 12D       Ladders, conductor-supporting     6F       Ladders, manhole     1C       Lamp accessories     5C       Lamp bulbs     9G       Lamp changers     12L       Lamp dimmers     3J       Lamp disposal units     12J       Lamp-failure indicators     10B       Lamp holders & spreaders, industrial     5E	Meter cabinets         5F           Meter seals         12V           Meter sockets & mountings         5H           Meter testers         10A           Metering & control switchboards         3C           Meters         10A           Mrog sets         8F           Mica insulation         12Q
Hot   Ine tools	Lamp sockets & holders         .5C           Lamp wire         .6D           Lamps, floor and table         .9A           Lamps, fluorescent         .9F           Lamps, incandescent         .9G           Lamps, portable         .9A           Lamps, lorancescent         .9G	Miniature lamps         9G           Miniature relays         3N           Miniature switches         3H           Miniature switches         8D           D Mobile towers         1B
1	Lanterns, post         9A           Lead wire         6D           Leaders, fish tape         12B           Leades, test         12L           Leads, water-cooled         6D           Level-indicating systems         3K           Level indicators         10B           Lift & towers, mobile         1B	Mobile transformers   2B
Identification nameplates	Lifting magnet connectors 6F Liftis, wire reel 12B Light dimmers 3, Light meters 10A Lighting fixtures 10A Lighting fixtures 4 fans, combined 11F Lighting fixtures 4 heaters, combined 11A Lighting glassware, louvers & reflectors 9H Lighting glassware, louvers & reflectors 9H Lighting standards 9D	Motor encapsulating kits 12U Motor-generators 8F Motor mountings 12N Motor ollers 12N Motor overload protectors 4E Motor replacement parts 12P Motor single-phasing protection 4E Motor speed controls 3M Motor-starting capacitors 12P Motor starting capacitors 12P
Indenters, conduit fitting	Lights, night 9A  Lights, night 9A  Limit switches 3H  Line hardware 1D  Line splices 1D  Line trucks 1B  Linemen's protective clothing 12A  Linemen's tools 12A  Links, high-voltage fuse cutout 4A  Links, renewable fuse cutout 4C  Liquid-flow-activiated switches 3H  Liquid-flow activiated switches 3H  Liquid-flow indicated switches 3H  Liquid-flow indicated switches 3H	Motor-starting relays   .3N   Motors   .8A to 8D   Mounting brackets, transformer   .2A   Mountings, meter   .5H   Mountings, meter   .12N   Mountings, motor   .12N   Mounts, shock-isolating   .12N   Multi-outlet assemblies   .5B
Industrial plugs & receptacies   5B	Linus, renewable tuse. 4C Liquid-flow-activiated switches 3H Liquid-flow indicators & alarms 10B Liquid-level surms 10B Liquid-level switches & controls 3H Liquid-level switches & controls 7G Liquid-level switches & controls 6D Liquid-level switches & controls 7G Litz cable 6D Load centers 3M	Nails, pole-dating

Portable heavy-duty switches	Reels, static grounding.         6E           Reflector-flood lamps         9G           Reflectors, lighting fixture         9H           Registers, in-and-out         10F           Regulators, motor speed         3M           Regulators, voitage         3P           Relays         3P           Relays         3N           Remote control cord sets         6N           Remote control switches         3H           Removers, wedge         12G           Residential lighting         9A           Resistance testers         10C           Resistors, dc fluorescent circuit         5C           Resistors, load         3P           Respirators         12W           Respirators         12W           Resurfacers, commutator         12E           Retracting cords         6E           Revolution counters         10B           Rheostats         3P
Power factor meters   10A	Retracting cords         6E           Revolution counters         10B           Rheostats         3P           Rigid conduit         7D           Rings, collecting         6F           Rings, commutator         2P           Rings, gimbal         9H           Ripper         9H           Ripper         12P           Ripper         12P           Rocker-type switches         5A           Rods, armour         1D           Rods, ground         4E           Rodis, insulation         12Q           Rolling stock, pole line         1B           Rotary relays         3N           Rotary switches         5A           Rotary switches, industrial         3K           Rubber tape         12R           Rubber tubing         12T           Running-thread, conduit         7E           Rust-preventives         12V
	Safety grounding equipment
Protectors, surge   AE	Safety grounding equipment
R	Setters   Discount   Setters   Discount
Raceway tools         12C           Racks, cable         1C, 6G           Racks, conduit         12C           Radiators, steam electric         11A           Radiators, transformer         2A           Radio systems, 2-way         10F           Radio systems, 2-way         10F           Ralis, crame         6H           Ralis, crame         6H           Ralis, crame         6H           Ralis, crame         6D           Raliway         6D           Raliway         6D           Raliway         6D           Range cords         6E           Range hoods         11F           Range eceptacles         5B           Recutors, saturable         3K           Reamers, conduit         12C           Receptacles         5B           Rechargeable dry cells         2E           Rechargeable hand lamps         9E           Rectiffers         2C           Rectiffers         2B           Reducers, lamp socket         6C           Reel lifts, wire         5E           Reel lifts, wire         5E           Reel lifts, wire         5E	Service station lighting.  Service station lighting.  Service state of the service state of the service state of the service state.  Sets, benerating.  Sets, benerating.  Sets, senerating.  Sets, senerating.  Sets, senerating.  Sets, senerating.  Serving machine motors.  Seving machine motors.  Seving machine motors.  Seving service state.  Seving machine motors.  Seving service state.  Seving seving service state.  Seving service state.  Seving service state.  Seving service state.  Seving service state.  Seving seving service state.  Seving ser
	Pouches, tool . 12A, 12K Powder plating equipment . 12X Powder onnectors . 6F Power conf switches . 3H Power factor capacitors . 3P Power factor capacitors . 3P Power factor meters . 10A Power factor meters . 10A Power factor meters . 10A Power severating sets . 8F Power factor meters . 10A Power severating sets . 8F Power tool motors . 3G Power tool motors . 12M Power wire & cable . 6A Preheaters, wire . 11C Preservative, wood . 12V Press motors . 8D Presser motors . 8D Pressure-connector tools . 12B Pressure connector . 12J Pressure-sensitive tape . 12R Pressure sequence controls . 3H Pressure sequence so . 12V Pricing service . 12X Primary batteries . 2EX Primary batteries . 2EX Primary switches . 3K Program clock systems . 10F Process controls . 3K Program clock systems . 3K Protection, cathodic . 4E Protective clothing . 12A, 12W Protective equipment (clothing) . 2W Protective seques acapacitor . 4E Protective seques . 2apacitor . 4E Protectiv

Snap-around meters   10A	T	Turntables, display
Soapstone conduit		the way read systems represent the second
Sockets, lamp	T-bars, lighting fixture9H Table lamps9A	
Sockets, meter	Tachometers         10A           Tags, wire & cable         12V           Takeoffs, power         12C           Tampers, coil         12D	11
Sodium-vapor lamps9F	Takeoffs, power	U
Solder	Tampers,         22A           Tamks, melting         12J           Tanks, melting         22           Tanks, transformer         2A           Tap-changing equipment         2A           Tap-changing transformers         2B           Tap switches         5A           Tap-changing transformers         2B           Tap switches         12D	Ultra-violet lamps9G
Solidering   Cable   12	Tanks, transformer2A	Ultra-violet lamps         9G           Ultra-violet display lighting         9C           Ultra-violet garden lighting         9A           Undercutters, armature         12E           Underfloor duct         7K           Underground boxes         5D
Soldering transformers2B Solderless connectors6F	Tap-changing transformers2B	Underdutters, armature
Solenoid coils 12V Solenoid-operated brakes 3K Solenoid valves 3K	Tape	Underground boxes
Solenoid valves 3K Solenoids 3K	Tap switches         5A           Tape         12R           Tape, fish         12B           Tape, heating         11C           Tapes, coil         12F           Taps, cord-connecting         5B           Taps, fused         5B           Teleption of combination outlets         5B           Television/ac combination outlets         5B           Television antenna outlets         5B	Underground boxes 5D Underwater lighting 9D Unions, explosion-proof 5E Unit heaters, electric 11A Unit substations 3A
Sound-level indicators	Tapers, coil	Unit substations3A
Sound-level indicators   10B	Taps, fused	
Space heaters, electric11A	Television/ac combination outlets5B Television antenna outlets5B	
Spacers, cable	Television antenna outlets5B Television, industrial & commercial10F Temperature controls3J	V
Splash-proof motors	Temperature indicators	V
Splicing compound	Temperature indicators 10B Temperature sequence controls 3H Temporary power connectors 6F Tents, manhole 1C Template blocks 6F	Vacuum cleaners
Split-tinned connectors		Valves, electrically operated3H
Sprayers	Terminal boxes, motor & generator	Valves, electrically operated         3K           Vaporproof boxes         5D           Vaporproof circuit breakers         4D           Vaporproof hand lamps         9E           Vaporproof lighting fixtures         9C           Variable-speed drives         8J           Variable voltage transformers         2B           Variable voltage transformers         2B
Spreaders, lamp	Terminators, cable	Vaporproof lighting fixtures9C
Stage lighting9C	Testing instruments 10C Textile motors 8D Thawing transformers 2B Theater switchboards 3C Thermal lamp starters 5C	Variable-speed drives
Stage lighting cable	Thawing transformers2B Theater switchboards3C	Varistors
Stair tread lights	Thermal lamp starters	Varnish 12U Varnished cambric tape 12H
Sounding devices   196	Thermal lamp starters	Variable voltage transformers         2B           Varistors         3P           Varneters         10A           Varnish         12U           Varnished canbric tape         12H           Varnished canvas         12U           Ventilating equipment         11F           Ventilatiors, manhole         1C           Vertical motors         8D           Vibration-isolating mounts         12N           Vibration meters         10A           Vises, pipe         12C           Voltage regulating transformers         2B           Voltage regulators         3P           Voltage testers         10C
Standards, lighting   9D     Stands, armature   12E     Stands, pipe vise   12C     Stands, soldering   12H     Stands, wire & cable   12B     Staplers, wire   12B     Staplers, wire   6G     Star drills   12M     Starters sockets   5C     Starters, fluorescent lamp   5C     Starters, motor   3M     Static balancers   12E     Static controls   3K     Static converters   2D     Static sickharge grounding reeis   6E     Static neutralizers & eliminators   12N     Static neutralizers & eliminators   3M     Statico, pushbutton   3M	Thermostat wire & cable6D	Ventilating equipment
Stands, wire & cable12B	Thinwall conduit	Vertical motors8D
Staples, cable	Thread guards, conduit	Vibration-isolating mounts
Star drills	Threaded inserts	Vises, pipe
Starters, fluorescent lamp	Through-cord switches	Voltage-regulating transformers2B Voltage regulators3P
Static controls	Time-delay fuses4B	Voltage testers
Static converters	Timing motors	Voltmeters10A Vulcanizing equipment12B
Static neutralizers & eliminators12N	Toggle bolts	
Stator fields	Torgle bolts         12K           Toggle switches         5A           Toggie switches, industrial         3H           Tongs, pole         12A           Tool bags & holders         12L	
Steam-powered generators8F	Tongs, pole 12A Tool bags & holders12L	W
Static neutralizers & eliminators   22N     Stations, pushbutton   3M     Stator fields   12E     Steam boilers (electric)   11C     Steam-powered generators   SF     Steam radiators   electric   11A     Stepping motors   3D     Stepping switches   3K     Steps, manhole   1C     Sticks, disconnect   12A     Steps   12A     Steps	Too chests   22D	**
Stepping switches	Tool pickups & grapples12C Tool pouches, buckets & bags12A, 12L	Wall air conditioners
Sticks, disconnect		Wall plates
Steps manhole	Tools, coil         12F           Tools, hand         12L           Tools, insulation         12G           Tools, linemen's         12A	Wall arr continuers         12K           Wall plates         3E           Warning lights         5C           Washers, reducing         5E           Wathers, leads         6D           Watherproof boxes         5E, 5D           Weatherproof calinets         5F
Storage batteries	Tools, insulation	Wastherproof boxes 5B 5D
Strain-relief bushings	Tools, portable electric	Weatherproof cabinets
Straps, cable	Tools, portable electric 12M Tools, fastening 12K Tools, raceway 12C Tools, shop—miscellaneous 12J	Weatherproof lighting
Street lighting9D	LOUIS, BUIGEFINE	Weatherproof boxes         5B, 5D           Weatherproof cabinets         5F           Weatherproof covers & plates         5E           Weatherproof motors         8C           Weatherproof motors         8C           Weatherproof sockets         5B           Weatherproof sockets         5C           Weatherproof switches         5A           Wedge drivers & removers         12G           Wedges, slot         12M           Welders         12J           Welding cable         6D
Street lighting cables   6D	Torches, soldering	Weatherproof switches
Street-lighting transformers2B	Totally enclosed motors	Wedge drivers & removers
Stringing equipment, wire	Towers, floodlighting	Welding cable
Strip, renewable fuse. 4C Strip switches, continuous 3H Strippers, wire 12B Stripping compound, wire 12V	Towers, work	Welding cable 6D Welding controls 3J Welding flux 12M Welding transformers 2B
Strippers, wire	Traffic signal lamps9G	Welding transformers
Stroboscopes	Totally enclosed motors	Whistles 10G
Studs, lighting fixture box	Trailer park panels 3D Trailers, office & workshop 12D Trailers, pole 1B Trapefor switches 2G	Winches 12D Winches, cable-pulling 12B Winders, coil 12F Winding motor & generator 12P
Structure, cable-supporting   6G	Transfer switches	Windings, motor & generator12P
	Transformer cabinets	Windings, motor & generator 12P Window air conditioners 11E Wire cable & cords 6A, 6B, 6C, 6D, 6E Wire & cable compounds 12M
Substations, unit	Transformer cabinets	Wire & cable reels
Supports, box 5E Supports, box 5E Supports, catenary 6H Supports, catenary 10 Supports, conductor 10 Supports, conductor 5G, 9H Supports, lighting fixture 5G, 9H Supports, lighting fixture & raceway combined 7H	Transformer tan-changing againment 94	Wire & cable reels
Supports, catenary	Transformers	Wire, fish
Supports, conduit	Trays, cable-supporting	Wire, fish   12B   Wire-installation guns   12B   Wire-prehasters   11C   Wire-stringing equipment   12A   Wire & strip, fuse   4C
Supports, lighting fixture & raceway combined	Tree trimmers & pruners 12A Trench braces 1C Trenchers 1B	Wire & strip, fuse
combined	Trenchers         1B           Trenching tools, hand         12A           Trimmers, tree         12A	Wire tags & markers 12M
Surface raceway .7H Surge protectors .4E Swimming pool heaters .11C		Wireholders, pole line1D
	Trolley wire	Wiring device boxes
Switch cabinets 5F Switch-operating mechanisms 3J Switchhoord mate 1917	Trouble lamps	Wiring devices
Switchboard mats		Work towers
Switches, disconnect 3M Switches, drum 3M Switches, explosion-proof 3G	Truck bodies         1B, 12D           Trucks, construction         1B           Trucks, hand         12D           Trucks, lift         12D	Wire & stripp fuse
Switches, field discharge3K		Wrapping, cable128
Switches, power	Tube-to-cable connectors	Wrapping, cable
Switches, field discharge 3K Switches, power 3G Switches, primary 3F Switches, rotary, industrial 5K Switches, wiring device 5A	Tube-to-cable connectors 6F Tubes, fluorescent 9F Tubes, lighting (standards) 9D Tubing, electric metallic 7F	
Switchgear	Tubing, flexible	
Switchplates	Tumbler switches	V
Synchronous converters 2D Synchronous motors 3B Synchronocopes 10B	Tubing, insulation   12Q   Tumbler switches   5A   Turbine-powered generators   8F   Turners, paper   12G   Turns-ratio testers   19C   Turntables, cable   12A	
Synchroscopes	Turntables, cable12A	Yard lights9D

#### SECTION 1. OUTDOOR DISTRIBUTION EQUIPMENT

See index for transmission line utilization equipment such as switches, transformers, cutouts, and pole line tools.

#### 1A. CONDUCTOR SUPPORTING STRUCTURES

Basic equipment used to support outdoor power transmission line conductors.

American Cresoste Works Inc 1305 Dublin St (Box 4008) New Orleans 18 La (1-2)
American Crossarm and Conduit Co 7726 Sheridan Rd Chicago 26 III (1)
Bell Lumber & Pole Co 524 Midland Bank Bldg Minneapolis 1 Minn (2)
Brooks Lumber Co P 0 Box 153 Bellingham Wash (1)
Brown Wood Preserving Co 409 Commonwealth Bldg Louisville 2 Ky (2)
Carrey (8 J) & Co 326 Peyton Bldg Spokane 8 Wash (2)
GENERAL (2) LetCTRIC SUPPLY CO 1260 Boston Ave Bridgeport Com (1-2-3)—ADV PG 84-85
GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (2)—ADV PG 2
Haley (R G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio (1-2)
Hatheway & Patterson Co Inc 15 County St Mans-

Hatheway & Patterson Co Inc 15 County St Mans-field Mass (1) Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1)

Hughes Bros Inc Seward Neb (1-3)
Husky Products Inc 5300 Vine St Cincinnati 17
Ohio (3)

Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III (1-2)

9 III (1-2)
Koppers Co Inc Wood Preserving Div 750 Koppers
Bldg Pittsburgh 19 Pa (2)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1)
McFarland (L D) Co McFarland Bldg Sandpoint
Lidaho (2)

iller (T R) Mill Co Inc Brewton Ala (1-2) les Inc E 706 Sprague Ave Spokane 3 Wash

Poles Inc E 706 Sprague Ave Spokane 3 Wash (1-2)

Republic Creosoting Co 1615 Merchants Bank Bidg Indianapolis 4 Ind (1-2)

Texas Creosoting Co P O Box 131 Orange Tex (1-2)

LIMION METAL MEG CO 1432 Manle Ave NE

●UNION METAL MFG CO 1432 Maple Ave NE Canton 5 Ohio (3)—ADV PG 119

#### 18. LINE TRUCKS & MOBILE EQUIPMENT

- Earth-boring trucks & machines
   Mobile towers & lifts
   Pole-setting trucks & bodies
   Trailers & dinkies
   Trenchers & ditchers

Adams Engineering Co 31711 Solon Rd Solon Ohio (1-4) Ohio (1-4)
Barber-Greene Co 400 N Highland Ave Aurora III (5)
Case (J I) Co Racine Wis (5)
Charles Machine Works Inc P O Box 66 Perry Oka (5)

UKIA 137 Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio (5) Davis Mfg Co Inc 1500 S McLean Blvd Wichita Kans (4-5)

Earthworm Boring Machine Inc 1415 14th St -(P 0 Box 1100) Santa Monica Calif (1) F W D Corp 105 E 12 St Clintonville Wis (1-3)

(1-5)
Gar Wood Industries Inc. Wayne Mich (5)
Highway Trailer Co. 405 E Fulton St. Edgerton
Wis (1-4)

Holan Corp 4100 W 150 St Cleveland 35 Ohio (1-2-3-4) Louis 15 Mo (1-2-3-4) No Broadway St. Louis 15 Mo (1-2-3-4) Mercury Hydraulics Inc 1632 Wazee St Denver 2 Colo (5)

Colo (5)

Mobile Aerial Towers Inc 1730 N Harrison St Fort Wayne Ind (2)

Morrison Steel Products Inc 601 Amherst St Buffalo 7 NV (1-2-3)

Pitman Mfg Co Garner Ave & Duck Rd Grandview Mo (2) Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (4)

Salem Tool Co 767 S Ellsworth Ave Salem Ohio (1) Silent Hoist & Crane Co 841 63rd St Brooklyn 20 NY (2-3) 

United States Air Conditioning Corp Skyworker Div Delaware Ohio (2) Utility Body Co 1530 Wood St Oakland 7 Calif (2-3) Hilliams (Hugh B) Mfg Co 8330 Lovett St (P O Box 7815) Dallas Tex (1-3)

#### IC. MANHOLE & TRENCH EQUIPMENT

1. Cable duct shields
2. Cable racks, hangers, arms, hooks & extensions
3. Clay duct dowel pins
4. Guard rail, shields & tents
5. Manhole cover hooks
6. Manhole frames & covers
7. Manhole ladders
8. Manhole steps
9. Pulling-in irons
10. Pumps
11. Ventilators
12. Trench braces

Basic underground equipment used in providing access to cable runs.

Alhambra Foundry Co Ltd 1147 Meridian Ave Alhambra Calif (6) Aurora Pump Div New York Air Brake Co 54 Loucks St Aurora III (10) Barry (William B) Co 117 Causeway St Boston 14 Mass (1)

Chain Belt Co 4701 W Greenfield Ave Milwaukee 1 Wis (10) nance (A B) Co 210 North Allen St Centralia Mo (1-2-3-7-9)

Mo (1-2-3-7-9)
Chicago Pneumatic Tool Co 6 E 44 St NY 17
NY (10)
Cope (T J) Div Rome Cable Corp Third & Walnut
Sts Collegeville 5 Pa (1-2-4-5-6-8-9)
Coppus Engineering Corp 344 Park Ave Worcester
10 Mass (11)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa
(1-2-3-7-8-9)
Husky Products Inc 5300 Vine St Cincinnati 17
Ohio (2)
Hypro Engineering Inc 700 39th Ave N E Minne-

Ohio (2)

Hypro Engineering Inc. 700 39th Ave N E Minneapolis 21 Minn (10)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III (2-9)

Kortick Mfg Co 5600 Third St San Francisco 24
Calif (2-3-4-5-7-8-9)

Calif (2-3-4-5-7-8-9)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (2-9)
Oliver Electrical Mfg Co P O Box 217 Battle
Creek Mich (1-2-3-7-8-9)
Piqua Machine & Mfg Co 441 S College St Piqua
Ohio (10)
St Louis Malleable Casting Co 7701 N Conduit
Ave St Louis 15 Mo (2)

STEEL CITY ELECTRIC CO 1207 Columbus Ave
Pittsburgh 33 Pa (2)—ADV PG 104
Swett (A L) Iron Works 166 Glernwood Ave Medina
NY (6-8-12)
United Electric Motor Co 178 Centre St NY 13
NY (11)
Utilities Service Co 1 Pine St Allentown Pa Utilities Service Co 1 Pine St Allentown Pa (2-7-8)

Chance (A B) Co 210 N Allen St Centralia Mo (4-5) (4-5)
Chase Brass & Copper Co Inc 236 Grand St
Waterbury 20 Conn (2)
Copperweld Steel Co Wire & Cable Div Glassport Pa (1-2-3)

port Pa (1-2-3)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (1-4)
Dixie Electrical Mfg Co P O Box 6325 Birming-ham 7 Ala (1-3-4-5)
Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio (4)
Fanner Mfg Co Electrical Products Div Brookside Park Cleveland 9 Ohio (5)
Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (5)

(5)
GEMERAL ELECTRIC SUPPLY CO 1260 Boston Ave Bridgeport Conn (1 thru 6)—ADV PG 84-85
GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-2-3-4-5)—ADV PG 2
Grip-Title Mfg Co 115 W Jefferson St Winterset Lowa (1)

Haley (R G) & Co Inc 767 Spitzer Bldg Toledo 4 Ohio (5) ubbard & Co 6301 Butler St Pittsburgh 1 Pa (1-2-3-4-5)

(1.2-3.4-5)

Hughes Bros Inc Seward Neb (1.3-5-6)

Hughes Bros Inc Seward Neb (1.3-5-6)

Hughes Bros Inc Seward Neb (1.3-5-6)

Hussey (C 0, & Co 2850 Second Ave Pittsburgh 1.9 Pa (2)

1.7-E Circuit Breaker Co Victor Insulators Div Victor NY (4)

Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III (1 thru 5)

Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (1)

Kimble Glass Co P 0 Box 1035 Toledo 1 Ohio (4)

Knox Porcelain Corp 2706 Mindex Ave Rose

(4)
Knox Porcelain Corp 2706 Mynders Ave P 0 Box 2031 Knoxville 1 Tenn (4)
Kortick Mfg Co 5600 Third St San Francisco 24
Calif (1 thru 6)
Lapp Insulator Co Inc 35 Gilbert St Leroy NY (4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (1-3-4-5)
Lint (Clyde W) 2323 W 18 St Chicago 8 III (4)
Mercury Products Inc Boston Post Rd Guilford Conn (3)

Lint (Clyde W) 232.7

Mercury Products Inc Boston Post Rd Guilford Conn (3)

Ohio Brass Co 380 N Main St Mansfield Ohio (4)

Oliver Electrical Mig Co P O Box 217 Battle Creek Mich (1-2-3-4-5)

Page Steel & Wire Div American Chain & Cable Co Inc P O Box 692 Monessen Pa (1)

Penn-Union Electric Corp 315 State St Erie Pa (1) Penn-u

(1) Jasper Blackburn Corp 1525
Woodson Rd St Louis 14 Mo (1)
Porcelain Products Co 224 N Patterson St Carey
Ohio (3-4-5)
Preformed Line Products Co 5349 St Clair Ave Ohio (3-4-5)
Preformed Line Products Co 5349 St Clair Ave
Cleveland 3 Ohio (1-5)
Premax Products DIV Chisholm-Ryder Co College
& Highland Aves Niagara Falls NV (2-3)
Railroad Accessories Corp Tenakill Park Cresskill
NJ (5)
Safety Live Line Tool Co 973 86th Ave Oakland 21
Calif (3-6)
St Louis Malleable Casting Co 7701 N Conduit Ave
St Louis 15 Mio (4-5)
South River Metal Products Co Inc 377 Turnpike

St Louis Malleable Casting Co 7701 N Conduit Ave St Louis 15 Mo (4-5)
South River Metal Products Co Inc 377 Turnpike South River NJ (1)
Superior Porcelain Co 931½ Market St Parkersburg W Va (4)
THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (5)—ADV PG 127
Universal Clay Products Co 1558 First St Sandusky Ohio (4)
[1] Italie Sanguice Co 1 Plan St Allentown Pa Utilities Service Co 1 Pine St Allentown Pa (1-2-3-4-5) Weaver (J A) Co 2110 Howard St St Louis 6 Mo (3)

#### 1D. POLE & TOWER EQUIPMENT

Anchoring & guying materials
 Dating nails & markers
 Grounding equipment
 Insulators & wireholders
 Pole, crossarm & line hardware
 Platforms & accessories

Pole & crossarm hardware includes such materials as dead ends, armor rods, line splices, brackets, special bolts and pins, catenary supports, etc.

Acromark Co 320 Morrell St Elizabeth 4 NJ Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (3) Brewer-Titchener Corp 111 Port Watson St Cort-land NY (5)

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

*Code No.					
1-1	Underground Iron 2 (Alhambra)	Hardware;	16p;	Cat.	No.

1-2 Porcelain Insulators & Fittings; 52p; Cat. No. P-59 (Chance)

1-3 Ditchers; 16p; Cat. No. F-209 (Gar Wood) Pole Line Hardware Construction Special-ties; 186p; Cat. No. 61 (Kortick)

#### SECTION 2. TRANSFORMERS AND CONVERSION EQUIPMENT

#### 2A. POWER & LIGHTING TRANSFORMERS, AUTOTRANSFORMERS & ACCESSORIES

Dry-type transformers
 Liquid-filled transformers
 Transformer radiators & tanks
 Tap-changing equipment
 Transformer mounting brackets

General-purpose transformers for substations, building light and power, and transmission line distribution.

A C Transformer Corp 89 Madison St Newark NJ

Acme Electric Corp 45 Water St Cuba NY (1)

• ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee 1 Wis (1-2)—ADV PG 74-75

American Rectifier Corp 95 Lafayette St NY 13

NY 131 Transforme Co 8330 Hegerman St Phila-

NY (1)
Atlantic Transformer Co 8330 Hegerman St Philadelphia 36 Pa (1)
Atlantic Transformer Div New London Instrument Co Inc 30 Hynes Ave Groton Conn (1-2)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (5)
Central Transformer Corp P O Box 687 Pine Bluff Ark (1-2)
Crittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif (1)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (1-2)
Delta-Star Electric Div H III Transformer Works H K Porter Co Inc 1030 Washington St San Carlos Calif (1-2)
Djeco Dly Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 III (1-2)
DNOSAN ELECTRIC MFG CO 2987-3001 Franklin St Detroit 7 Mich (1)—ADV PG 92
Elsier Engineering Co Inc 5 13 St Newark 3 NJ (1-2)
Electro Engineering Works 401 Preda St San

NJ (1-2)
Electro Engineering Works 401 Preda St San
Leandro Calif (1)
Erie Electric Co Inc 120 Church St Buffalo 2
NY (1-2)
Emsco Mfg Co P O Box 1039 Greenville Tex
(1-2)

PY Liver Emsco Mfg Co P O Box 1039 Investment (1-2)

FEDERAL PACIFIC ELECTRIC CO 50 Paris St Newark 5 NJ (1-2)—A0V PG 105

General Electric Co Apparatus Sales Schenectady 5 (NY) (1-2)

CEMERAL ELECTRIC SUPPLY CO 1260 Boston Ave

ueneral Electric Go Apparatus Sales Schenectady 5
(NY) (1-2)

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn (1-2-3-5-6)—ADV PG 84-85

GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1-2)—ADV PG 2
Hevi Duty Electric CO 3002 W Burleigh St (P 0
Box 563) Milwaukee 1 Wis (1)
Hindle Transformers CO Inc Woods Church Rd
Flemington NJ (1)
Hughes Bros Inc Seward Neb (6)
I-T-E Circuit Breaker CO 1900 Hamilton St Philadelphia 30 Pa (1-2)
Jefferson Electric CO 25th & Madison Bellwood
III (1)
Jeffries Transformer CO 610 Turner St Lac A-

Jeffries Transformer Co 610 Turner St Los Angeles 12 Calif (1) Kortick Mfg Co 5600 Third St San Francisco 24 Calif (6)

Kuhlman Electric Co P O Box 288 Birmingham Mich (1-2) Land-Air Inc 7444 W Wilson Ave Chicago 31 Ill (1)

Land-Air Inc. 7444 W Wilson Ave Chicago 31 III
(1)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 III (1)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1-2-5)
Magnatran Inc. P. O. Box 211 Kearny NJ (1-2)
MARCUS TRANSFORMER CO INC Leswille Ave
Rahway NJ (1-2)—ADV PG 112
Moloney Electric Co 5390 Bircher Blvd St Louis
20 Mo (1-2-5)
WIAGARA TRANSFORMER CORP 1751 Dale Rd
Buffaio 25 New York (1-2)—ADV PG 86-87
Nothelfer Winding Labs Inc. 220 Ewingville Rd
(P. O. Box 455) Trenton 3 NJ (1)
Pennsylvania Transformer Div McGraw-Edison Co
Box 330 Canonsburg Pa (1-2)
Precision Transformer Corp 2483 Greenleaf Ave
Elk Grove Village III (1-2)
R T & E Corp 1900 East North St Waukesha Wis
(2)

(2)

(2)
Raytheon Mfg Co Commercial Apparatus & Systems
Div 100 River St Waitham 54 Mass (1)
Shaw-Perkins Mfg Co 201 E Carson St Pittsburgh
19 Pa (3)
SORGEL ELECTRIC CO 838B W National Ave Milwaukee 4 Wis (1)—ADV PG 115
Standard Transformer Co 140 Dana St N E Warren Ohio (1-2)
THIEL TOOL & ENGINEERING CO 1417 N Market

Standard Fransformer Co 140 Dana St N E Warren Ohio (1-2)

THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (6)—ADV PG 127
Uptegraff Mfg Co R E P O Box 182 Scottsdale Pa (1-2)

UTILITY TRANSFORMER AND EQUIPMENT CO 702 Lynn Ave Baraboo Wis (1)—ADV PG 129
Wagner Electric Corp 6400 Plymouth Ave St Louis 33 Mo (1)

Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-2-5) •WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)—

Center (Box 448) ADV PG 2nd cover

#### 28. SPECIAL PURPOSE TRANSFORMERS

Arc & discharge lamp
Control
Heating
Ignition
Instrument
Phase-changing or -shifting
Rectifying

Phase-changing or -shifting
Rectifying
Plee thawing
Signalling
Tap-changing
Variable voltage
Voltage-regulating
Welding, soldering & brazing
Current-limiting
Isolating
Furnace control
Grounding
Machine tool
Loading
Mobile
Street lighting

# Transformers designed to serve specific or specialized functions or equipment.

A C Transformer Corp 89 Madison St Newark NJ (2-3-6-7-13) (2-3-6-7-13)
Accurate Engineering Co 2005 Blue Island Ave Chicago 8 III (6)
Acme Electric Corp 45 Water St Cuba NY (1-2-5-6-7-9 Hrvs 13-15-18)
Acro Welder Mfg Co 1719 W St Paul Ave Milwaukee 3 Wis (13)
Advance Transformer Co 2950 N Western Ave Chicago 18 III (1)
Allis-Chaimers Mfg Co 930 S 70th St Milwaukee 1 Wis (5-7-10-12)
Annis (R B) Co 1101 N Delaware St Indianapolis 2 Ind (5)
Ariac Products Inc 55-5-59 Halstead St Rochester

2 Ind (5)
Arjac Products Inc 55-59 Halstead St Rochester
10 NY (1)
Associated Research Inc 3789 W Belmont Ave
Chicago 18 Ill (5)
Atlantic Transformer Co 8330 Hegerman St
Philadelphia 36 Pa (6)
Atlantic Transformer Div New London Instrument
Co Inc 30 Hynes Ave Groton Conn (5-9)
Berkshire Transformer Corp Kent Conn (2-34-5-7-9-10-13)
Bush Transformer Corp 707 North St Endicott NY

Bush Transformer Corp 707 North St Endicott NY (2 thru 7-9-10-12)

Cable Electric Products Inc 234 Daboil St Providence 7 RI (9)
Central Transformer Co 900 W Jackson Blvd Chiansformer Co 900 W Jackson Blvd Chi-Central Transformer Co 900 W Jackson Blwd Chicago 7 Ili (2-9-13)
Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (1)
Crest Transformer Corp 1834-36 W North Ave Chicago 22 Ili (2-9)
Cittenden Transformer Works Inc 13011 S Spring St Los Angeles 61 Calif (3-5-7)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (2)
Davenort Mfg Div. Duppan Flectric Co. Inc. 2532

Duster-riammer Inc 228 N 12th St Milwaukee 1 Wis (2)
Davenport Mfg Div Duncan Electric Co Inc 2532 N Elston Ave Chicago 47 III (5)
Daystrom Inc Weston Instruments Div 614 Freling-huysen Ave Newark 12 N (5)
Deco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 III (2-5-7-10-12)
Dongan Electric Mfg Co 2987-3001 Franklin St Detroit 7 Mich (1-2-4-9-18)
Dormeyer Industries 3418 Milwaukee Ave Chicago 41 III (2-47-11)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (14)
Easco Products Inc (P O Box 587) Ypsilantl Mich (11)
Edwards Co Inc Narwalt Com (2)

(11)

Edwards Co Inc Norwalk Conn (9)

Electran Mfg Co 1901 Clybourn Ave Chicago 14

III (1-2-56-67-9-10-13)

Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 III (5-15)

Electro Engineering Works 401 Preda St San Leandro Calif (6)

Faraday Inc 2011 W Beecher Rd Adrian Mich (5-9)

France Mfg Co 10325 Berea Rd Cleveland 2 Ohio (1-3)

Ohio (1-3)
General Electric Co Apparatus Sales Schenectady 5
NY (2 thru 7-9 thru 12)
General Radio Co West Concord Mass (11)
Harold Electric Co 210 E Adler St Walla Walla
Wash (8)
Hevi Duty Electric Co 3002 W Burleigh St (P 0
Box 563) Milwaukee 1 Wis (2-3-6-10-12)

Hindle Transformer Co Inc Woods Church Rd Flemington NJ (2-3-6-7-9) Hughely & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (15) Jefferson Electric Co 25th & Madison Bellwood III (1-2-4)

III (1-2-4)
Jeffries Transformer Co 610 Turner St Los
Angeles 12 Calif (2)
Knopp Inc 1307 66th St Oakland 8 Calif (5)
Kolton Electric Mfg Co 123 New Jersey Railroad
Ave Newark 5 NJ (2-6)
Lee Electric Inc 566 52nd St West New York
NJ (9)
Liberty Rail Mar Co 6

MARCUS TRANSFORMER CO INC Lesville Ave Rahway NJ (6-7-13-16)—ADV PG 112 McCarthy Electric Co 9640 Grinnell Detroit 13 McCarthy Electric Co Mich (13-16)

Mich (13-16)
Midwest Electric Products Inc 1515 N Front St
Mankato Minn (5)
Moloney Electric Co 5390 Bircher Blvd St Louis
20 Mo (7-10-12)
Nepo Mfg 00 4230 N Sayre Chicago 34 III (1)
NIAGARA TRANSFORMER CORP 1751 Dale Rd
Buffalo 25 NY (16)—ADV PG 65-713)
Notheffer Winding Labs Inc 220 Ewingville Rd
(P 0 Box 455) Trenton 3 N J (3-5-7-13)
Nutone Inc Madison & Red Banks Roads Cincinnati 27 Ohio (9)
Ohmite Mfg Co 3601 Howard St Skokie III (11)

Ohmite Mfg Co 3601 Howard St Skokle III (11)
Opad Electric Co 43 Walker St New York 13
NY (7) rick & Wilkins Co 51 N Seventh St Phila 6

Pa (9)
Pennsylvania Transformer Div McGraw-Edison Co
Box 330 Canonsburg Pa (10-16)
Precision Transformer Corp 2483 Greenleaf Ave
Elik Grove Village III (2-3-7-13)
Raytheon Mfg Co Commercial Apparatus & Systems
Div 100 River St Waltham 54 Mass (7-13)
Rittenhouse Co Inc. 68 East St Honeoye Falls NY
(9)

(9) Rus

ssell & Stoll Co Inc 125 Barclay St NY 7

NY (2)
Sangamo Electric Co 11th & Converse Springfield
III (5)
Siegler Corp Magnetic Amplifiers Div 632 Tinton
Ave New York 55 NY (2-7-12-18)
Sierra Electric Corp 15100 S Figueroa St (P 0
Box 85) Gardena Calif (7-14)
Simplex Co Inc 1139-41 N MacArthur Bivd Springfield III (5)
Sola Fleetric Div Basic Products Corp 1719 Busse.

neid III (5) Sola Electric Div Basic Products Corp 1719 Busse Rd Elk Grove III (1-12) Sorensen & Co Inc Richards Ave South Norwalk Conn (6-7-12)

Conn (6-7-12)

SORGEL ELECTRIC CO 838B W National Ave Milwaukee 4 Wis (2-3-6-7-8-9-10-13-14-17-18)—
ADV PG 115 western Industrial Electronics Co 10201 West-mer (P 0 Box 22187) Houston 27 Tex

(5-7-12)
Standard Electrical Products Co 2240 E Third St
Dayton 3 Ohio (11-12)
Standard Transformer Co 140 Dana St N E Warren
Ohio (5)
States Co 19 New Park Ave Hartford 6 Conn (6)
Superior Electric Co 83 Laurel St Bristol Conn
(5.11)

Taylor-Winfield Corp 1052 Mahoning Ave N W Warren Ohio (3-13) Touch-Plate Mfg Corp Box 1970 Long Beach Calif (2) Trine Mfg Corp 1430 Ferris Pl New York 61 NY (9)

(9)
United States Electronics Corp 275 Warren St Lyndhurst NJ (2)
United Transformer Co 150 Variet St New York 13 NY (1-2-3-5-7-9-11-12)
Uptegraff (R E) Mig Co P 0 Box 182 Scottsdale Pa (5)
UTILITY TRANSFORMER AND EQUIPMENT CO 702 Lynn Ave Baraboo Wis (6-7)—ADV PG 129
Victor Ventilator Div Philip Carey Mig Co Middletown Ohio (9)
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif (5)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (18)

#### 2C. RECTIFIERS

Copper oxide
 Electronic tube
 Germanium
 Mechanical
 Selenium
 Silicon

Apparatus used for industrial applications which require conversion of alternating to direct current.

Accurate Engineering Co 2005 Blue Island Ave Chicago 8 III (5)

Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (3-6) Rectifier Corp 95 Lafayette St NY 13 NY (5-6) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (5-6) NJ (3-6) Semiconductor Corp 275 Walton St New Haven 11 Conn (1-5-6) Cathodic Protection Service 4601 Stanford St Houston Tex (5-6) Cathodic Protection Service 4601 Stanford St Houston Tex (5-6) C. and Laboratories Box 3997 Bethany Station Lincoln 5 Neb (1-5) Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 III (2-3-5-6) Gates Electronic Co 2090 Barnes Ave Bronx 62 NY (5-6) RY (5-6)
General Electric Co Apparatus Sales Schenectady 5
NY (5-6)
Good-All Electric Mfg Co 112 W First St Ogalla
Neb (5-6)
1-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (6)
ITT Components Div P 0 Box 412 Clifton NJ
(5-6) (3-6) Kneisley Electric Co 2501-2509 Legrange St Toledo 3 Ohio (2-5-6) Magnatran Inc P O Box 211 Kearny NJ (2) Mallory (P R) & Co Inc 30 S Gray St Indianapolis Mallory (P K. 6 Ind (1) d Electric Co 43 Walker St New York 13 NY Potter & Rayfield Inc P 0 Box 1042 Atlanta Ga (2) Pyramid Electric Co 1445 Hudson Blvd North Bergen NJ (5) Radio Receptor Co Inc 240 Wythe Ave Brooklyn 11 NY (5) Rapid Electric Co Inc 2881 Middletown Rd Bronx 61 NY (5-6) napin electric Co Inc. 2881 Middletown Rd. Bronx 61 NY (5-6)
Reliance Electric & Engineering Co. 24701 Euclid Ave. Cleveland 17 Ohio (2)
Richardson-Allen Corp. 116-15 Fifteenth Ave. College Point L1 NY (5-6)
Sanford Miller Co Inc. 11 Lynch St. Brooklyn. 11 NY (5-6)
Schauer Mfg. Corp. 4500 Alpine Ave. Cincinnati. 42 Ohio (1)
Shrader (F. W). Co. 11623 S. Broadway. Los Angeles 61 Calif. (5-6)
States Co. 19 New Park Ave. Hartford 6. Conn. (3)
Stearns Electric Corp. 120 N. Broadway. Milwaukee. 2. Wis. (5)
Sylvania Electric Corp. 120 N. Broadway. Milwaukee. 2. Wis. (5)
Sylvania Electric Products Inc. 730 Third Ave. New York. 19. NY. (3)
Sylton Co. 690 Lexington Ave. Homer. City. Pa. (5-6). (3-6) Ther Electric & Machine Works 17 S Jefferson St Chicago & Iii (1-2-5) Versabar Corp 14 Whyte St Jersey City NJ (6) Weitronic Co 19500 W Eight Mile Rd Detroit 41 Mich (2)

2E. BATTERIES

Ideal Electric & Ohio (1-2-3-5)

Sangamo III (5)

System A

Primary dry cells are replaced when exhausted; primary wet cells may be restored by replacing electrolyte and electrodes when necessary. Secondary or storage batteries are recharged using a primary source of electrical energy.

Mfg Co East First St Mansfield

umu (1-2-3-5)
Jerrold Electronics Corp Jerrold Bidg 15th & Lehigh Ave Philadelphia 32 Pa (1)
Kato Engineering Co 1442 First Ave Mankato Minn (1-2-3-5)

Minn (1-2-3-5)
Katolight Corp First Ave at Chestnut (P 0 Box 891) Mankato Minn (5)
Knopp Inc 1307 66th St Oakland 8 Calif (3)
Knopp Inc 1307 66th St Oakland 8 Calif (3)
Knop Inc 1307 Set Engineering Corp 232 East
North Island St Appleton Wis (1)
Leach Corp 18435 Susana Rd Compton Calif (1 thru 5)

(1 thru 5)
Minneapolis-Honeywell Regulator Co Boston Div 40
Life St Boston 35 Mass (4)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1)
Safety Electrical Equipment Corp 1187 Dixwell Ave
New Haven Conn (1 thru 5)
Sangamo Electric Co 11th & Converse Springfield
III (5)

111 (5) Siegler Corp Magnetic Amplifiers Div 632 Tinton Ave New York 55 NY (2-4) Sorensen & Co Richards Ave South Norwalk Conn (1-2)

(1-2) States Co 19 New Park Ave Hartford 6 Conn (3) Syntron Co 690 Lexington Ave Homer City Pa (4) System Analyzer Corp 700 W State St Nokomis

Terado Co 1068 Raymond Ave St Paul 14 Minn (2)

Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (1) Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (1)

Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (1 thru 5)

Bright Star Industries 600 Getty Ave Clifton NJ

Burgess Battery Co Freeport III (1)
C & D Batteries Div Electric Autolite Co Washington & Cherry Sts Conshohocken Pa (3)
Carbone Corp 400 Myrtic Ave Boonton NJ (1-2)
Cellomatic Battery Corp Archbaid Pa (3)
Dillin (Frank W) Corp 315 W Adams Blvd Los
Angeles 7 Califf (3)
Dual-Lite Co Inc Newtown Conn (3)
DuBois Electric Storage Battery Co 500 W DuBois
Ave DuBois Pa (3)
Edison (Thomas A) Industries McGraw-Edison Co
Storage Battery Div West Orange NJ (3)

Ave DuBois Pa (3)
Edison (Thomas A) Industries McGraw-Edison Co
Storage Battery Div West Orange NJ (3)
Exide Industrial Div Electric Storage Battery Co
Rising Sun & Adams Ave (P 0 Box 5723) Philadelphia 20 Pa (3)
General Battery and Ceramic Corp Box 1262 Reading Pa (3)
Gould-National Batteries Inc Trenton 7 NJ (3)
Gulton Industries Inc Alkaline Battery Div Metuchen NJ (3)

chen NJ (3)
Mailory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind (1) Marathon Battery Co P O Box 298 Wausau Wis

(1) National Carbon Co 30 E 42 St New York 17 NY (1-2) Nicad Div Gould-National Batteries Inc Easthampton Mass (3) Perkins Battery Co 214 Golden Lane New Oxford Pa (3) Scratton Storage Battery Corp. Archhald Pa (3)

Perkins Battery Co 214 Golden Laine New Oxford Pa (3)
Scranton Storage Battery Corp Archbald Pa (3)
Scranton Corp Elmsford NV (3-4)
Standard Electric Co Inc P O Box 6356 San Antonio 9 Tex (3)
Surrette Storage Battery Co Inc Jefferson Ave Salem Mass (3)
Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa
Willard Storage Battery Div Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio (3)
Wisco Div Electric Storage Battery Co 1222 18th St Racine Wis (3)
Yardney Electric Corp 40-50 Leonard St New York 13 NY (2-3)

Equipment, complete with necessary con-trols, for restoring secondary batteries. Mai incorporate metallic-oxide rectifers, elec-tronic tube rectifiers, or motor-generator set.

Electric Specialty Co 211 South St Stamford
Conn (1)
Elliott Co Jeannette Pa (1)
Fairbanks Morse & Co Electrical Div 303 N
Henderson Freeport III (1)
General Electric Co Apparatus Sales Schenectady 5
NY (1 thru 5)
Georator Corp Manassas Va (1)
Hertner Electric Co 12690 Elmwood Ave Cleveland
11 Ohio (1-2-5)
Ideal Electric & Mig Co East First St Mansfield

2F. BATTERY CHARGERS
Equipment, complete verols, for restoring secon incorporate metallic-ox tronic tube rectifiers, or
Accurate Engineering Co
Chicago 8 III
Arme Electric Corp 45 Wal Accurate Engineering Co 2005 Blue Island Ave Chicago 8 III Acme Electric Corp 45 Water St Cuba NY American Rectifier Corp 95 Lafayette St M NY 13 natic Switch Co 50-56 Hanover Rd Florham Pk NJ Blitz Electric Co 5713 Wentworth Ave Chicago 21 Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 Control Panel Corp 4431 W Division St Chicago 51 Cornell-Dubilier Electric Corp 333 Hamilton Blvd
South Plainfield NJ
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis
Djeco Div Djordjevic Engineering Co 1933 N Damen
Ave Chicago 47 Ill
Edison "Thomas A) Industries McGraw-Edison Co
Storage Battery Div West Orange NJ
Electric Products Co 7125 Clarkstone Rd Cleveland
12 Ohio Electric Products Co 7125 Clarkstone Rd Cleveland 12 Ohio Electric Service Systems Inc 1330 Quincy St N E Minneapolis 13 Minn Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III Fox Products Co 4720 N 18 St Phila 41 Pa Gates Electronic Co 2090 Barnes Ave Bronx 62 NY General Battery and Ceramic Corp Box 1262 Read-General Electric Co Apparatus Sales Schenectady 5 Gould-National Batteries Inc Trenton 7 NJ Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio

11 Ohio
Hobart Bros Hobart Square Troy 1 Ohio
Howard Industries Inc. 1760 State St. Racine Wis
International Electric Fence Co Inc. Box 650 Albert
Lea Minn
Jeta Inc. Yonkers NY
Kato Emgineering Co. 1442 First. Ave. Mankato
Minn.

Katolight Corp First Ave at Chestnut (P O Box 891) Mankato Minn

Ratolight Corp First Ave at Chestnut (P U Box 891) Mankato Minn
Kohler Co Kohler Wis
Kurz & Root Sales & Engineering Corp 232 East
North Island St Appleton Wis
Lincoln Electric Co 22801 St Clair Ave Cleveland
17 Ohio
Mallory (P R) & Co Inc 30 S Gray St Indianapolis 6 Ind
Motoresearch Co 1600 Junction Ave Racine Wis
Coran Div Studebaker-Packard Corp 2515 University
Ave SE Minneapolis 14 Minn
Pioneer Gene E- Motor Co 5841 W Dickens St
Chicago 39 III
Quick Charge Div Little Giant Corp 3810 N Tulsa
St Oklahoma City Okia
Rex Metal Craft Inc 1717 Gent St Indianapolis 2
Ind

Ind Richardson-Allen Corp 116-15 Fifteenth Ave Col-

lege Point LI NY Schauer Mfg Corp 4500 Alpine Ave Cincinnati 42

Ohio
Simplex Co Inc 1139-41 N MacArthur Blvd Springfield III
Sorenson & Co Inc Richards Ave South Norwalk
Conn
Syntron Co 690 Lexington Ave Homer City
Terado Co 1068 Raymond Ave St Paul 14 Minn
Triple-A Specialty Co 2835 N Western Ave Chicago 18 III
U S Electric Motor Co Cadiz Ohio
Universal Motor Co 438 Universal Dr Oshkosh
Wis

Wis Willard Storage Battery Dlv Electric Storage Battery Co 246-286 E 131 St Cleveland 8 Ohio Winpower Mfg Co Newton Iowa

2D. CONVERTERS

1. Frequency changers

Inverters

2. Inverters
3. Phase converters & shifters
4. Static converters
5. Synchronous (rotary) converters

Static and rotary converters are used to transform ac current to dc; inverters (static or rotary) are converters which transform dc oc. Frequency changers convert normal 60-cycle current to a higher frequency; phase converters provide 2 - or 3-phase power from a single-phase source, or vice versa.

Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (2-3-5-6)

Acme Electric Corp. 45 Water St. Cuba NY (3-4) Allis (Louis) Co. 427 East Stewart St. Milwaukee 1 Wis (1) ers Mfg Co 930 S 70th St Milwaukee 1 Allis-Chalmers N Wis (1-4-5) American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2-5) NJ (1-2-5)
NJ (1)
NJ (1 S NJ (1)
Cornell-Dubilier Electric Corp 333 Hamilton Bivd
South Plainfield NJ (2)
D & R Ltd 402 E Gutierrez St P 0 Box 1500
Santa Barbara Calif (1)
Dalmotor Co 1375 Clay St Santa Clara Calif (1)
Djeco Div Djordjevic Engineering Co 1933 N Damen
Ave Chicago 47 III (2-4)
Electric Machinery Mfg Co 4235 W North Ave Chicago 39 III (1-2-5)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (1)
Electric Motors & Specialties Inc King & Hamsher
Sts Garrett Ind (1)

#### 2G. BATTERY & CHARGING ACCESSORIES

Auxiliary equipment specifically intended to aid in the use and care of batteries and charging equipment, such as cable leads and clamps, testers, charging plugs and

Allen Electric and Equipment Co 2101-2117 N
Pitcher St Kalamazoo Mich
Anderson (Albert & JM) Mfg Co 289 A St Boston 10 Mass
Belden Mfg Co P O Box 5070A Chicago 80 III
Blitz Electric Co 5713 Wentworth Ave Chicago 21 Bryant Mfg Co 410 N Paulina St Chicago 22 III
C & D Batteries Div Electric Autolite Co Wash-ington & Cherry Sts Conshohocken Pa Columbia Wire & Supply Co 2850 Irving Park Rd Chicago 18 III

Exide Industrial Div Electric Storage Battery Co Rising Sun & Adams Ave (P 0 Box 5723) Philia-delphia 20 Pa Fox Products Co 4720 N 18 St Phila 41 Pa General Battery and Ceramic Corp Box 1262 Read-ing Pa Goldak Co Inc 1544 W Glenoaks Blwd Glendale 1

Calif
Hessel (W F) Co Inc 74 Beekman St NY 38 NY
Jordan Electric Products Electric Storage Battery
Co P O Box 6266 Cleveland 1 Ohio
Joy Mfg Co Electrical Products Div 1201 Macklind
Ave St Louis 10 M6
Mueller Electric Co 1555G E 31 St Cleveland 14 Ohio

New Jersey Zinc Co 160 Front St New York 38 NY NY
Ohmite Mfg Co 3601 Howard St Skokie III
Penn-Union Electric Corp 315 State St Erle Pa
Russell & Stoll Co Inc 125 Barclay St NY 7

NY
St Marys Carbon Co State St St Marys Pa
Sittler Corp 18 N Ada St Chicago 7 III
Stackpole Carbon Co Stackpole St St Marys F
Triple-A Specialty Co 2835 N Western Ave Ch
Cago 18 III
Victor Instrument Mfo Co Loro 32 M (CO

Victor Instrument Mfg Co Inc. 33 W 60 St New York 23 NY

Walker Brothers P O Box 33 Conshohocken Pa Willard Storage Battery Div Electric Storage Bat-tery Co 246-286 E 131 St Cleveland 8 Ohio

#### 2H. POWER SUPPLIES

Bradley Semiconductor Corp 275 Welton St New Haven 11 Conn 3410 West 67 St Los Angeles 43 Calif Gates Electronic Co 2090 Barnes Ave Bronx 62

Harder (Donald C) Co 2580 K St San Diego 2 Calif

Hughes Aircraft Co Vacuum Tube Products Div 2020 Short St Oceanside Calif Jordan Electronics 121 S Palm Ave Alhambra Calif

Calif
Kin Tel Div Cohu Electronics Inc
Villa Rd San Diego 12 Calif
Sensitive Research Instrument Corp
New Rochelle NY
Sorensen & Co Richards Ave South Norwalk Conn

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

*Code	Description, Pages
No.	Catalog No. & Mfr.

- Dry Type Transformers; 23p; Cat. No. 701C (Jeffries) 2-1
- Constant-Current Transformers; 14p; Cat. No. SL-703 (Moloney) 2-2
- 2-3 Custom Built Transformers; 20p (Nothelfer)
- Transformers for Underground Distribution; 15p; Cat. No. 100 (RT&E) 2-4
- 2-5 Power Supply Handbook; 38p (Sorensen)

#### SECTION 3. SWITCHING & CONTROL EQUIPMENT

Indicating devices and alarms used in conjunction with switches and controls are listed in Section 10.

#### 3A. UNIT SUBSTATIONS

Complete assemblies for transformation and distribution of power.

Acme Electric Corp 45 Water St Cuba NY

ALLIS-CHALMERS MFG CO 930 S 70th St
Waukee 1 Wis—ADV PG 74-75

Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III
Empire Switchboard Co Inc 810 Fourth Ave Brook-NY

Esco Mfg Co P O Box 1039 Greenville Tex FEDERAL PACIFIC ELECTRIC CO 50 Paris St Newark 5 NJ—ADV PG 105 General Electric Co Apparatus Sales Schenectady 5

NY
General Electric Co Distribution Assemblies Dept
41 Woodford Ave Plainville Conn
GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn—ADV PG 84-85
Hughes Bros Inc Seward Neb
1-T-E Circuit Breaker Co 1900 Hamilton St
Philadelphia 30 Pa
Kinney Electrical Mfg Co 678 Buckeye St Elgin
111

Line Material Industries McGraw-Edison Co 700 W Michigan St. Milwaukee Wis Metropolitan Electric Mfg Co 2250 Steinway St. Long Island City 5 NY Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St. Los Angeles 58 Calif Nelson Electric Mfg Co P O Box 5385 Tulsa Okla Okla

Niagara Transformer Corp 1751 Dale Rd Buffalo 25 NY

Pennsylvania Transformer Div McGraw-Edison Co Box 330 Canonsburg Pa Royal Electric Mfg Co 1122 E 87 St Chicago 19

SORGEL ELECTRIC CO 838B W National Ave Milwaukee 4 Wis—ADV PG 115 Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC Square D Co Executive Plaza Park Ridge III Standard Transformer Co 140 Dana St N E Warren

Westinghouse Electric Corp PO Box 2278 Pittsh 30 Pa Electric & Mfg Co Inc 2134 Curtis Denver Colo Young Electric & Mfg Co Int. 2 Colo 2 Colo Zinsco Electrical Products 729 Turner Los An-geles 12 Calif

#### 3B. SWITCHGEAR

Enclosed assembly of switching and inter-rupting devices and associated equipment for distribution of power.

The state of the s

 ALLIS-CHALMERS MFG CO 930 S 70th St Mil-waukee 1 Wis—ADV PG 74-75
 Cleveland Switchboard Co 2925 E 79 St Cleveland Ohio Continental Electric Equipment Co Box 1055 Cin-Cinnati 1 Ohio
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III
Empire Switchboard Co Inc 810 Fourth Ave Brook-

iyn 32 NY
FEDERAL PACIFIC ELECTRIC CO 50 Paris St
Newark 5 NJ—ADV PG 105
G & W Electric Specialty Co 3500 W 127 St Blue
Island III
General Electric Co Apparatus Sales Schenectady 5

MY

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn ADV PG 84-85

GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY—ADV PG 2

Gustaveson Inc 8600 Chestnut St Kansas City 32

Mocircuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa Lake Erie Electric Mfg Co 3907 Perkins Ave Cleveland 14 Ohio Marquette Electric Switchboard Co 311 N Desplanes St Chicago 6 III N Desplanes St Chicago 6 II N Desplanes St

Russell & Stoll Co Inc 125 Barclay St NY 7 NY
S & C ELECTRIC CO 4435 Ravenswood Ave Chicago 40 III—ADV PG 128
Siegler Corp Magnetic Amplifiers Div 632 Tinton
Ave New York 55 NY
Square D Co Executive Plaza Park Ridge III
Westinghouse Electric Corp P 0 Box 2278 Pittsbusch 30 Pa

burgh 30 Pa

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway
Center (Box 448) Pittsburgh 30 Pa—ADV PG
2nd Cover

Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo Zinsco Electrical Products 729 Turner Los An-geles 12 Calif

#### 3C. SWITCHBOARDS

Metering & control
 Power & light
 Stage
 Laboratory & experimental

Metering & control boards and panels moundevices used to regulate, indicate and recor operation of such equipment as boilers, tubines, furnaces and industrial processin equipment.

Adam (Frank) Electric Co 3647 Windsor PI St Louis Mo (2-3) Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2)

wils LL-61 Alwalt Mfg Co Inc 1706 Lapham Dr (P O Box 1271) Modesto Calif (1) Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (3)

Century Lighting Inc 521 W 43 St New York 36 NY (3)

Century Lighting inc 521 W 43 St New York 36 New 1678 36 New 1678

Empire Switchboard Co Inc 810 Fourth Ave Brook-lyn 32 NY (1-2-3-4)

In 32 NY (1.2-3-4)

Seco Mfg Co P O Box 1039 Greenville Tex (2)

FEDERAL PACIFIC ELECTRIC CO 50 Paris St

Newark 5 NJ (2)—ADV PG 105

Gemco Electric Co 256BS W Eight Mile Rd Detroit 40 Mich (1-2)

General Electric Co Apparatus Sales Schenectady 5

NY (1-2)

General Electric Co Distribution Assemblies Dest

NY (1-27)
General Electric Co
41 Woodford Ave Plainville Conn (1)
Gustaveson Inc 8600 Chestnut St Kansas City 30
Mo (2-3) Hub Electric Co 2255 W Grand Ave Chicago 12 III (3)

Hub Electric Co 2255 W Grand Ave Chicago 12 III (3)

1-T-E Circuit Breaker Co BuilDog Electric Products Div 7610 Jos Campau Detroit Mich (2)

1-T-E Circuit Breaker Co Walker Div P O Box 2384 Station D Atlanta Ga (1-2)

1deal Electric and Mfg Co East First St Mansfield Ohio (1-2)

Kato Engineering Co 1442 First Ave Mankato Minn (1)

Kinney Flectrical Mfg Co 678 Buchave St Edgic

Kinney Electrical Mfg Co 678 Buckeye St Elgin 111 (2)

111 (2)
Kliegi Bros Universal Electric Stage Lighting Co Inc.
321 W 50 St NY 19 NY (3)
Kolton Electric Mfg Co 123 New Jersey Railroad
Ave Newark 5 NJ (2)
Lake Erie Electric Mfg Inc. 2952 W 22 St Erie
Pa (1-2-3)
Lake Shore Electric Corp. 205 Willis St. Bedford
Ohio (2)
Leeds & Northrup Co. 4970 Stepton Ave. Phila 44

Northrup Co 4970 Stenton Ave Phila 44

Leonard Electric Mfg Co 3907 Perkins Ave Cleve-land 14 Ohio (3)

Machinery Electrification Inc 56 Hudson St Northboro Mass (2)
Major Equipment Co Inc 4603 W Fullerton Ave Chicago 39 III (3)
Marquette Electric Switchboard Co 311 N Despiaines St Chicago 6 III (2)
Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 Ny (1-2-3-4)
Mullenbach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (2)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (1-2)

Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (2)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY

Countern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC (2) Square D Co Executive Plaza Park Ridge III (2-3) Standard Electric Time Co 89 Logan St Springfield 2 Mass (4) Constitution of the Constitution of th Superior Electric Co 83 Laurel St Bristol Conn (3)

Viking Instruments Inc East Haddam Conn (1)
Waiker Div I-T-E Circuit Breaker Co 125 Bennett
St NW Atlanta Ga (1-2)
Westinghouse Electric Corp P 0 Box 2278 Pitts-Viking Instruments Inc East Haddam Conn (1)
Walker Div I-T-E Circuit Breaker Co 125 Bennett
St. NW Atlanta Ga (1-2)
Westinghouse Electric Corp. P. O. Box 2278 Pittsburg 30 Pa (1-2)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway
Center (Box 448) Pittsburgh 30 Pa (1-2)
ADV PG 2nd cover
Young Electric & Mfg Co Inc 2134 Curtis Denver 2
Colo (1-2-3)
Zinsco Electrical Products 729 Turner Los Angeles

Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (1-2-3)

#### 3D. PANELS & PANELBOARDS

Service, lighting & power
 Explosion-proof
 Trailer Park
 Control

For circuit division and protection.

Adam (Frank) Electric Co 3647 Windsor PI St
Louis Mo (1) Louis Mo (1)
Alwalt Mrg Co Inc 1706 Lapham Dr (P O Box 1171)
Modesto Calif (1)
Appleton Electric Co 1701-59 Wellington Ave
Chicago 13 III (1)
Automatic Control Co 995 University Ave St Paul
4 Minn (1) minn (1) Cleveland Switchboard Co 2925 E 79 St Cleveland 4 Ohio (1) Continental Electric Equipment Co Box 1055 Cin-cinnat 1 Ohio (1) ti 1 Ohio (1)
Panel Corp 4431 W Division St Chicago 51

Crouse-Hinds Co Syracuse 1 NY (2)
CUTLER-HAMMER INC 228 N 12th St Milwaukee
1 Wis (1)—ADV PG 60-81
Empire Switchboard Co Inc 810 Fourth Ave Brook-

In 19 September 2 September 2

NY (1)
General Exectric Co Circuit Protective Devices Dept
41 Woodford Ave Plaimville Conn (1)
General Electric Co Distribution Assemblies Dept
41 Woodford Ave Plaimville Conn (1)
GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn (1-2-3)—ADV PG 84-85
General Switch Co 45 Roebling St Brooklyn 11
NY (1) ustaveson Inc 8600 Chestnut St Kansas City 30 Mo (1) Gustas

Mo (1)

Hoffman Engineering Corp 1050 Tyler St Anoka
Minn (3)

1-T-E Circuit Breaker Co BullDog Electric Products
Div 7610 Jos Campau Detroit Mich (1)

1-T-E Circuit Breaker Co Walker Div P 0 Box 2384
Station D Atlanta Ga (1)

KILLARK ELECTRIC MFG CO 3940 Easton Ave
St Louis 13 Mo (1-2)—ADV PG 78-79

Kinney Electrical Mfg Co 678 Buckeye St Elgin
III (1)

Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (1) Lake Erie Electric Mfg Inc 2952 W 22 St Erie Pa (1)

Pa (1)
Leonard Electric Mfg Co 3907 Perkins Ave Cleveland 14 Ohio (1)
Machinery Electrification Inc 56 Hudson St Northboro Mass (1)
Magnetics Inc Box 391 Butler Pa (4)
Midwest Electric Products Inc 1515 N Front St
Mankato Minn (1)
Mullenbach Div Electric Machinery Mfg Co 2100
E 27 St Los Angeles 59 Calif (1)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16
NY (1)

nst LLP Myers Electric Products Inc 3019 S Vail Ave Los Angeles 22 Calif (3) Nelson Electric Mfg Co P O Box 5385 Tulsa Okka (1) Nelson Electrical Mfg Co 221 Washington St nd 7 Calif (1) Oakland 7

Pyle-National Co 1344 N Kostner Ave Chicago 51
III (1-2)
Russell & Stoll Co Inc 125 Barclay St NY 7
NY (1-2)
Square D Co Executive Plaza Park Ridge III (12-4) Sun Electric Products Inc 28 S Day St Orange United Enterprises 15735 S Paramount Blvd Paramount Calif (3)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (1)
Westinghouse Electric Corp P 0 8ox 2278 Pittsburgh 30 Pa (1-2)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway
Center (Box 448) Pittsburgh 30 Pa (1)—
ADV PG 2nd Cover
Young Electric A Mfg Co Inc 2324 Curety Danver United Enterprises 15735 S Paramount Blvd Para-

Young Electric & Mfg Co Inc 2134 Curtls Denver 2 Colo (1) Zinsco Electrical Products 729 Turner Los An-geles 12 Calif (1) Zi

Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis Memoo Engineering & Mfg Co Inc Commack LI Powercraft Corp 2215 De Kalb St St Louis 4 Powerdyne Inc 17150 Boones Ferry Rd Oswego Ora Royal Electric Mfg Co 1122 E 87 St Chicago 19 III

19 III
S & C ELECTRIC CO 4435 Ravenswood Ave. Chicago
40 III—ADV PG 128
Southern Electrical Equipment Co 308 West Bland
at Mint St Charlotte 3 NC
Square D Co Executive Plaza Park Ridge III
USCO Power Equipment Corp 829 N 36th Way
Birmingham 4 Ala
Wattingham 5 Not Corp. 8 0 8 No. 2228 Pitts Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa

#### 3E. FRAMING & ENCLOSURES

Metal framing members, enclosures, and mount-ing structures for substation, switching, and con-trol equipment.

Acme Steel Co 135th St & Perry Ave Chicago 27 American Steel & Iron Works 5801 S Lowe Ave Chicago 21 III Chicago Wire Iron & Brass Works 2411 W Belmont Ave Chicago 18 III Continental Electric Equipment Co Box 1055 Cin-Ohio Eliza Metal Products Co Box 408 Bridgeville Empire Switchboard Co Inc 810 Fourth Ave Br lyn 32 NY Empire SwitchDoarus of the State Sta

Mandy Angle Div Lug-All Co 355 Lancaster Ave Naverord Pa HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn—ADV PG 102-118

HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hillside NJ—ADV PG 109

HUENEFELD CO ENGINEERING PRODUCTS DIV 2701 Spring Grove Ave Cincinnati 25 Ohio—ADV PG 113

LTLE Circuit Breaker Co Greensburg Div P O Circuit Breaker Co Greensburg Div P 0

Box 96 Greensburg Pa KEVSTONE MFG CO 23328 Sherwood Rd Warren Mich—ADV PG 123 Kirk & Blum Mfg Co 3120 Forrer St Cincinnati Mult-A-Frame Corp 6401 Epworth Blvd Detroit 10 Mich Parker Electrical Mfg Co 221 Washington St. Oakland 7 Calif Power-Strut Div Van Huffel Products Inc Dietz Rd Warren Ohio Queen Products Co Inc Louisville 3 Ky R & IE Equipment Div I-T-E Circuit Breaker Co Greensburg Pa Russell & Stoll Co Inc 125 Barclay St NY 7

NY
STEEL CITY ELECTRIC CO 1207 Columbus Ave
Pittsburgh 33 Pa—ADV PG 104
SPRING CITY ELECTRICAL MFG CO Spring City
85 Pa—ADV PG 114-116
Unistrut Products Co 933 Washington Blvd Chicago 7 III Cago 7 III Versabar Corp 14 Whyte St Jersey City NJ Young Electric & Mfg Co Inc 2134 Curtis Denver

#### 3F. PRIMARY SWITCHES

Switches (over 600v) for distribution pole lines, structures and eugipment.

Chance (A B) Co 210 North Allen St Centralia Chance (A B) Co 210 North Allen St Gemtralia
Mo
Continental Electric Equipment Co Box 1055 CIncinnat 1 Ohio
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 IH
Electrical Engineers Equipment Co 25th Ave &
Division St Melrose Park III
Federal Pacific Electric Co 50 Paris St Newark
5 NJ 5 NJ G & W Electric Specialty Co 3500 W 127 St Blue Island III General Electric Co Apparatus Sales Schenectady

S NY
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY—ADV P6 2
I-T-E Circuit Breaker Co Greensburg Div P 0
Box 98 Greensburg Pa
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III

#### 3G. POWER SWITCHES

Automatic transfer
 Dead-front switchbe
 Isolating
 Knife
 Oil
 Safety
 Terrice entrance
 Explosion-proof

Switches (600v and less) for power distribution

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (4-6-7)

Adam (Frank) Electric Co 3647 Windsor PI St Louis Mo (4-6-7)
Alien-Bradley Co 13.6 W Greenfield Ave Milwaukee 4 Wis (1-8)
American Electric Switch Div Clark Controller Co 114.6 E 152 St Cleveland 10 Ohio (6-7)
Anderson (Albert & JM) Mfg Co 28.9 A St Boston 10 Mass (4)
Arrow-Hart & Hegeman Electric Co 10.3 Hawthorn St Hartford & Conn (6-7-8)
AUTOMATIC SWITCH CO 50-56 Hanover Rd. Fiorham Pk NJ (1)—ADV PG 71
Barber Electric Mfg Co Inc 30 Chestnut St N Attieboro Mass (4-6-7)
Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohio (2-4)
Clark Controller Co 114.6 E 152 St Cleveland 10 Ohio (4-7-8)
Connecticut Electric Mfg Co Main St Bantam Conn (4) Conn (4)
Controls Co of America Control Switch Div 1420
Delmar Dr Folcroft Pa (8)
Crouse-Hinds Co Syracuse 1 NY (6)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-2-3-4-6-7-8)

Cutler-Hammer Inc. 228 N 12th St Milwaukee 1
Wis (1-2-3-4-6-7-8)

Delta-Star Electric Div H K Porter Co Inc. 2437
Fulton St Chicago 12 III (1-6)

Derrick Light & Equipment Co. 1201 E Daggett
(P O Box 414) Fort Worth Tex (8)

Electric Distribution Products Inc. 2200 31st St.
S W Allentown Pa (6)

Empire Switchboard Co Inc. 810 Fourth Ave Brooklyn 32 NY (1 thru 5-7)

Esco Mfg Co P O Box 1039 Greenville Tex (5)

FEDERAL PACIFIC ELECTRIC CO. 50 Paris St.
Newark 5 NJ (6)—ADV PG 105
G W Electric Specialty Co. 3500 W 127 St. Blue
Island III (1-5)

Gemoc Electric Co. 25685 W Eight Mile Rd. Detroit 40 Mich (8)

General Electric Co. Gircuit Protective Devices
Dept 41 Woodford Ave Plainville Conn (4-6-7-8)

Central Switch Co. 45 Poehling St. Brooklyn 11 General Switch Co 45 Roebling St Brooklyn 11 NY (6-7)

GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (1-4-5-6-7)—ADV PG 2
 Hoffman Engineering Corp 1050 Tyler St Anoka Minn (4-7)

Hoffman Engineering Corp 1050 Tyler St Anoka Minn (4-7)

HOPE ELECTRICAL PRODUCTS CO INC Av Hillside NJ (8)—ADV PG 109

I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (2)

I-T-E Circuit Breaker Co BullDog Electric Products Div 7610 Jos Campau Detroit Michael (2-6-7)

I-T-F Circuit Breaker Co Greensburg Div P 0

C2-6-7)

1-T-E Circuit Breaker Co Greensburg Div P O
Box 98 Greensburg Pa (3-7)

1-T-E Circuit Breaker Co Greensburg Div P O
Box 98 Greensburg Pa (3-7)

1-T-E Circuit Breaker Co Walker Div P O Box
2384 Station D Atlanta Ga (1-2-6-7)
Kearney (James R) Corp 4236 Clayton Ave St
Louis 10 Mo (3)

KILLARK ELECTRIC MFG CO 3940 Easton Ave
St Louis 13 Mo (6-7-8)—ADV PG 78-79
Kolton Electric MFG Co 123 New Jersey Raliroad
Ave Newark 5 NJ (6)
Lake Shore Electric Corp 205 Willis St Bedford
Ohio (1)
Kelek Co 59 Davis Ave Norwood Mass (7)
Lumenite Electronic Corp 407 S Dearborn St
Chicago 5 III (1)

Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 NY (2-3-4-6-7) Midwest Electric Products Inc 1515 N Front St Mankato Minn (7) Monitor Controller Div Atlee Corp 99 Grove St Rockland Mass (1) Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY (6-7) NY '(6-7)
Palmer Electric & Mfg Co 24 Water St Wakefield
Mass (1-6-7)
Parker Electrical Mfg Co 221 Washington St
Oakland 7 Calif (6-7)
Powercraft Corp 2215 De Kalb St St Louls 4
Mn (3-4)
Pringle Electrical Mfg Co 1900-1912 N Sixth St
Philadelphia 22 Pa (3-4-7)
Pyle-National Co 1344 N Kostper Ave Chicago 51
III (6-8)
Rees (Mackworth G) Inc 1573 E Forest Ave De-III (cs-8) Rees (Mackworth G) Inc 1573 E Forest Ave Detroit 7 Mich (6) Russeil & Stoll Co Inc 125 Barclay St NY 7 NY (8) Electric Co 11th & Converse Springfield III (5) Sierra Electric Corp 15100 S Figueroa Gardena Calif (4) Square D Co Executive Plaza Park Ridge III (1-4-6-7-8) (1.4-6-7-8)
Unimax Switch Div W L Maxson Corp Ives Rd
Wallingford Conn (8)
Wadsworth Electric Mfg Co Inc 20-34 W 11th
St (Box 272) Covington Ky (4-6-7)
Westinghous Electric Corp P O Box 2278 Pittsburgh 30 Pg (1.2-3-4-5-7-8)
Westinghous Electric Corp Standard Control Div Standard Control Div Westi nghouse Electric Corp Westinghouse Electric Corp Standard Control UV
Beaver Pa (6)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa
(1-2-3-4-5-6-7-8)—ADV PG 2nd Cover
Young Electric & Mfg Co Inc 2134 Curtis Denver
2 Colo (1-2-3-7)
Zenith Electric Co 155 W Walton St Chicago
10 III (1)
Zinsco Electrical Products 729 Turner Los Angeles 12 Calif (2-6)

#### 3H. CONTROLS & CONTROL SWITCHES

Centrifugal Flashing Flow Foot-operated Footmat-operated Key-operated Limit (lever, toggle or pushbutton) Liquid level (float) Liquid level (float)
Mercury
Photoelectric
Pressure or vacuum
Remote control
Rotary top
Timing
Miniature & subminiature
Molded power cord Snap Proximity Temperature sequence Pressure sequence
Pressure sequence
Pushbuttons, door chime
Dashpots
Pushbutton switches, industrial
Toggle switches, industrial
Limit switches, explosion-proof
Continuous strip controls

Physically actuated devices performing con-trol functions through the energizing or de-energizing of electrical circuits.

Abrams Instrument Corp 606 E Shiawasee St Lansing Mich (10-14)
Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (8)
Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 0hio (7-14-15)
Aemo Inc 10 State St Mankato Minn (2-14)
Aero Instrument Co 11423 Vanowen St North Hollywood Calif (11)
Altken-Reed Inc 2802 Wollmer St Manitowac Wis (14)
Alcor Mfg Co 1140 S Seventh St De Kalb III Cor Mfg Co 1140 S Seventh St De Kalb III (3-7-13-15-17) Ald Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (4-7-8-11-13-14) Almo Mfg Co Inc 618 Jersey Ave Union Beach NJ (9)

NJ (9)
American-Standard Controls Div 5900 Trumbull
Ave Detroit 8 Mich (11)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn
St Hartford 6 Conn (13)
AutoFYRStop Co 2035 Washington Ave Phila 46
Pa (14)

Pa (14)
Automatic Control Co 995 University Ave St Paul
4 Minn (3-8-9-11-12-14)
Automatic Devices Div American Machine &
Metals Inc Sellersville Pa (14-20-21)

◆AUTOMATIC SWITCH CO 50-56 Hanover Rd Flor-ham Pk NJ (2-3-12)—ADV PG 71 Automation Products Inc 3030 Max Roy St Hous-ton 24 Tex (8) Automatic Timing & Controls Inc King of Prussia Pa (11-12-14) Pa (11-12-14) Autotron Inc 3629 N Vermilion St Danville III (10-14) B/W Controller Corp 2200 E Maple Rd Birming-ham Mich (8) ham Mich (8)

Barkelew Electric Mfg Co 1905 Columbia Ave Middetown Ohio (13)

Middetown Ohio (14)

Columbia (13)

Middetown Ohio (14)

Columbia (13)

Middetown Ohio (14)

Columbia (13)

Middetown Ohio (13)

Middetown Oh NJ (7)

Com-Pak-Ett Mfg Corp 650 Grand St Allegan Mich (10)

Controls Co of America Controls Switch Div 1420
Delmar Dr Folcroft Pa (7-15)
Controls Co of America 2450 N 32 St Milwaukee
45 Wis (3-8-11-14-17)
Convair In P 0 Box 9671 Pittsburgh 16 Pa
(3) Counter & Control Corp. 4503 W Brown Deer Rd Milwaukee 23 Wis (14) Cramer Controls Corp. Main St. Centerbrook Conn. (14) use-Hinds Co Syracuse 1 NY (2) Crouse-Hinds Co Syracuse 1 NY (2)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-3-4-6-7-8-10-11-15)
Daystrom Inc Weston Instruments Div 6.14 Frelinghuysen Ave Newark 12 NJ (11)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (13)
Denison (R B) Mfg Co 386 Broadway Bedford
Ohio (7)
Dietz (Henry G) Co Inc 12-16 Astoris Bird Long Unit (/)
Dietz (Henry G) Co Inc 12-16 Astoria Blvd Long
Island City 2 NV (11-14)
Durant Mfg Co 1900 N Buffum St Milwaukee 1
WIS (10) Wis (10)

Dwyer (F W) Mfg Co Woodland at Greenwood (P O Box 373) Michigan City Ind (11)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (2)

Eastern Specialty Co 3617 N 8th St Phila 40 Pa (13) Pa (13)
Edoc International Corp 20722 W Seven Mile Rd
Detroit 19 Mich (14)
Elastic Stop Nut Corp of America Elizabeth Div
1027 Newark Ave Elizabeth NJ (14)
Electric Switch Corp 2320 S Tibbs Ave P 0 Box
41037 Indianapolis 41 Ind (9-14)
Electrical Mfg Co 425 Lake Ave Racine Wis
(4) (4) ectro Switch Corp King Ave Weymouth 88 Mass (13-15-17) (13-15-17)
Electronic Control Corp 15341 Dale Detroit 23
Mich (10)
Electronics Corp of America One Memorial Dr
Cambridge Mass (10-12-14-15)
Euclid Electric & Mfg Co 50 Edwards St Madison
Ohio (1) Ohio (1)

Exide Industrial Div Electric Storage Battery Co.

Rising Sun & Adams Ave (P 0 Box 5723)

Philadelphia 20 Pa (14)

Farmer Electric Products Co Inc 2300 Washington

St Newton Lower Falls 62 Mass (10-14)

Fisher-Pierce Co 170 Pearl St South Braintree 85

Mass (10)

Fulton Sylphon Div Behandling Mass (10)
Fulton Sylphon Diw Robertshaw-Fulton Controls
Co Box 400 Knoxville 1 Tenn (11)
FURNAS ELECTRIC CO 1067 McKee St
III (4-7-8-11-13)—ADV PG 92
Gem Electric Mfg Co Inc 237 37th St Brooklyn
NY (2) Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (7) 40 Mich (7)
General Control Co 1200 Soldiers Field Rd
Boston 34 Mass (4-14)
General Controls Co 801 Allen Ave Glendale
Calif (3-47-9-11-14)
General Electric Co Air Conditioning Dept Central
Air Conditioner Troup Highway Tyler Tex (14)
General Electric Co Apparatus Sales Schenectady
5 NY (4-7-9-10) thru 14)
Haft & Sons Inc. 950 Kent Ave Brooklyn 5 NY Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY (2) aledy Electronics Co 57 William St NY 5 NY (2-3-8-9-10-11) Hankscraft Co Control Dlv Reedsburg Wis (14) Haydon (A W) Co 4060 Ince Blvd Culver City Calif (14)

Haydon (A W) Co 232 N Elm St Waterbury Conn (14) Haydon Div General Time Corp 245 E Elm St Torrington Conn (14)

Torrington Coun (14)
Hays Mfg Co Automatic Controls Dlv 12th and
Liberty Sts Erie 6 Pa (3)
Healy-Ruff Co Water Level Controls Dlv 2255
University Ave St Paul 14 Minn (8-11-12)
Heat-Timer Corp 657 Broadway New York 12
NY (14)

NV (14)

HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (10)—ADV PG 102-118

Hughes Aircraft Co Vacuum Tube Products Div 2020 Short St Oceanside Calif (14)

Hughey & Phillips Inc 3200 North San Fernando Blvd Burbank Calif (2-10)

Hypro Engineering Inc 700 39th Ave N E Minneapolis 21 Minn (11)

Industrial Automation Corp 2415 W Montrose Ave Chicago III (2-9)

INTERNATIONAL REGISTER CO 2620 W Washington Bive Chicago 12 III (14)—ADV PG 99 Iron Fireman Mfg Co Electronics Div 2838 S E 9th Ave Portland 2 Ore (14)

Jo-Bell Products Inc 5456 W 111 St Oak Lawn III (8-19) ctronics 121 S Palm Ave Alhambra Jordan Elect Calif (14) Calif (14)

Joy Mfg Co Electrical Products Div 1201 Macklind
Ave St Louis 10 Mo (16-18)

Kneisley Electric Co 2501-2509 Lagrange St
Toledo 3 Ohio (13)

Kulka Electric Corp 633 S Fuiton Ave Mount
Vernon NY (2)

Leach Corp 18435 Susana Rd Compton Calif
(14-15) Lee Electric Inc 566 52nd St West New York NJ (22) RU (22)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn
22 NY (2-7)
Lewis Engineering Co 52 Rubber Ave Naugatuck
Conn (13)
Licon Switch & Control Div Illinois Tool Works
6606 W Dakin St Chicago 34 Ill (7-15-18)
Line Electric Co 229 River St Drange NJ (4)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (10)
Linemaster Switch Corp Woodstock Conn (4)
Machinery Electrification Inc 56 Hudson St Northboro Mass (8)
Magnetrol Inc 2110 S Marshall Blvd Chicago 23
Ill (3-8) boro Magnetrol III (3-8)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis
6 Ind (13-14)
Manning Maxwell & Moore Inc 250 E Main St
Stratford Conn (8-11-12)
McDonnell & Miller Inc 3500 N Spaulding Ave
Chicago 18 III (3-8)
Mercoid Corp 4201 W Belmont Ave Chicago 41
III (99) Micro Balancing Inc 191 Herricks Rd Garden City Park NY (10) Micro Switch Div of Minneapolls-Honeywell Regulator Co Chicago & Spring Freeport III (4-7-9-12-13-15) Midwest Electric Products Inc 1515 N Front St Mankato Minn (14) Miller Harris Instrument Co 1134 S First St Milwaukee 4 Wis (14) Milwaukee 4 Wis (14)
Minneapolis-Honeywell Regulator Co 2753 Fourth
Ave S Minneapolis 8 Minn (11-14)
Monitor Controller Div Atlee Corp 99 Grove St
Rockland Mass (7)
Mossman (Donald P) Inc P 0 Box 265 Brewster
NY (7) NY (7)
Nankervis (Geo L) Co 15300 Fullerton Ave Detroit
27 Mich (7)
National Acme Co Electrical Controls Div 170 E
131 St Cleveland 8 Ohio (7)
National Time & Signal Corp 21800 Wyoming Ave
Detroit 37 Mich (14)
Network Indies Inc P O Box 397 Bayonne
1, 17)
National Time S Control Signal Corp 21800 Wyoming Ave
Detroit 37 Mich (14)
Network Indies Inc P O Box 397 Bayonne
National Mich Co 3 W 18 Se New York 13 NY Mfg Co 3 W 18 St New York 11 NY mite Mfg Co 3601 Howard St Skokle III (13) Paragon Electric Co 1600 12th St Two Rivers Wis (14) Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (5-6) Penn Controls Inc Goshen Ind (3-8-11)
Photobell Co Inc 43 Vesey St New York 7 NY (10) Inc 96 S Washington Ave Bergenfield NJ (10-15) Post Electronic Products 12 Lothrop St Beverly Mass (10-14) Mass (10-14)
Powrex Switch Co 36 Pleasant St Watertown
Mass (9)
Progress Mig Co Inc Castor Ave & Tulip St Philadelphia 34 Pa (10)
Recora Co Inc Powis Rd (Box 68) St Charles III
(4-2) (4-5) Rees (Mackworth G) Inc 1573 E Forest Ave De-troit 7 Mich (4-6-7) Reliance Time Controls Inc 1927 Mead St Racine Wis (14) Reynolds Electric Co 3000 River Rd River Grove 111 (2) Rhodes (M H) Inc. 30 Bartholomew Ave Hartford 6 Conn (14) Ripley Co Inc Factory St Middletown Conn (10) Rittenhouse Co Inc 68 East St Honeoye Falls NY (22) Robot Industries Inc. 7041 Orchard St. Dearborn Mich (5) Mich C3/
Mig Co Inc 6th & Minor Sts Emmaus
Pa (2)
Roth Controls Inc Box 900 Evanston III (10)
Sangamo Electric Co 11th & Converse Spring-Sangamo Electric Co 11th & Converse Spring-field III (7-14) Sargent Electric Corp 630 Merrick Rd Lynbrook Sargent E NY (7) ntrols Inc P 0 Box 41 Delanco NJ (11-12-15) (11-12-15)
Seely Instrument Co Inc 377 Fourth St (P 0
Box 387) Niagara Falls NY (14)
Shallcross Mfg Co Preston St Selma NC (7-13)
Siegler Corp Magnetic Amplifiers Div 632 Tinton
Ave New York 55 NY (10-12)
Sierra Electric Corp 15100 S Figueroa St (P 0
Box 85) Gardena Calif (17)
State Division Plays Rath Bidge 111 Square D Co Executive Plaza Park Ridge III (4-6-7-8-11-12-13-14-19)

Standard Electric Time Co 89 Logan St Spring-field 2 Mass (14') Star-A Electric Mris Co Inc 269 Meserole St Brooklyn 6 NY (2) Supreme Electric Products Co 194 Vassar St Rochester 7 NY (14) Rochester 7 chnical Electri Rochester 7 NY (14)

Technical Electronics Co do60 Ince Blvd Culver Clty Calif (14)

Tigerman Engineering Co 4332 N Western Ave Chicago 18 III (9)

Tork Time Controls Inc 1000 Grove St Mt Vernon NY (14)

Tripe Mfg Corp. 1430 Ferris Plane New York Trine Mfg Corp 1430 Ferris Place New York 61 NY (22) 61 NY (22) Unimax Switch Div W L Maxson Corp Ives Rd Wallingford Conn (4-7) Vernaline Products Co 511 Commerce St Frank-iin Late NJ (4-14) Viking 1 8-11) Instruments Inc East Haddam Conn (2-3-Wallace & Tiernan Inc 25 Main St Belleville NJ (2) NJ (2)
Walser Automatic Timer Corp 420 Lexington Ave
New York 17 NY (14)
Warrick (Chas F) Co 1964 W Eleven Mile Rd
Berkley Mich (8)
Webster Electric Co 1900 Clark St Racine Wis
(14) Weltronic Co 19500 W Eight Mile Rd Detroit 41 Mich (14) Mich (14)

Mich (14)

Mestinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (1-9-12-14-15)

Mestinghouse Electric Corp Standard Control Div

Beaver Pa (7-8)

Mich Rodgers Co 9797 Reavis Rd St Louis 23

Mo (7-11-12) ilson (G C) & Co 1915 Eighth Ave Huntington W Va (14) Winterburn Mfg Co P O Box 386 Putnam Conn (3) Workite Mfg Co 612-620 Colorado Ave Santa Monica Calif (4-7-11) •ZENITH ELECTRIC CO 155 W Waiton St Chicago 10 III (12-14)—ADV PG 114

#### 31. EQUIPMENT SWITCHES & CONTROLS

Appliance switches
 Battery switches & charging controls
 Door & gate openers
 Electric fence controllers
 Electroplating controls
 Generators as backs.

3. Electroplating controls
6. Generator controls
7. Heating system & temperature controls
8. Light dimmers
9. Street-lighting controls
10. Switch-operating mechanisms
11. Welder controls
12. Crane controls
13. Pump controls

Devices intended for use with specific items

ACF Industries Inc ACF Electronics Div Riverdale ACF Industries Inc ACF Electronics Div Riverdale Md (8)

Acme Wire Co Utility Products Div 1255 Dixwell Ave New Haven Conn (9)

Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (1-7)

Altken-Red Inc 2802 Wollmer St Manitowac Wis (10)

Althe Electric Co. 954 Experient Ave. Phila 23 Ajax Electric Co 954 Frankford Ave Phila 23 Pa (7) Pa (7)
Alcor Mfg Co 1140 S Seventh St De Kalb III (1)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee
4 Wis (7) Mfg Co Inc Lake Park Blvd Alliance Alliance M Ohio (3) rican-Standard Controls Div 5900 Trumbull we Detroit 8 Mich (1-7) robe Instrument Corp 630 Merrick Rd Lynbrook Y (7) Arjac Products Inc 55-59 Halstead St Rochester
10 NY (4) Ark-Les Switch Corp 51 Water St Watertown Mass (1) Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1) St Hartford 6 Conn (1) Assembly Products Inc Chesterland 31 Ohio (7) Assembly Products Inc Chesterland 31 Ohio (7) Assembly Products Inc Chesterland 31 Ohio (7) Chesterland Allows Inc Control Co 995 University Ave St Paul 4 Minn (7-10) Automatic Devices Div American Machine & Metals Inc Sellersville Pa (7) Berko Electric Mfg Corp 182-20 Liberty Ave Jamaica 12 NY (7) Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1) Burling Instrument Co Inc 16 River Rd Chatham NJ (7) NJ (7)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (8)
Ceitheat Inc 5212 Homberg Drive (P 0 Box 10066) Knoxville Tenn (7)
Century Lighting Inc 521 W 43 St New York 36
NY (8)
Certify E Min Co. 720 Morganith St Trenton 4 Mfg Co 720 Monmouth St Trenton 4 Circle F N NJ (1-2)

Cold Cathode Lighting Corp. 76 S Bayles Ave. Port. Washington NY (8).
Columbia Electric Mfg. Co. 4519 Hamilton Ave. Cleveland 14. Ohio (5).
Connecticut Electric Mfg. Co. Main St. Bantam. Conn (2).
Controls Co. of America. 2450 N. 32 St. Milwaukee. 45. Wisc. (1-7-10).
Counter & Control Corp. 4503 W. Brown. Deer. Rd. Milwaukee. 23. Wis. (10).
Crane (M. W). Co. 15. N. 9th. Ave. Maywood. III. Crane (H W) Co 15 N 9th Ave Maywood III Cutier-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-5-7-10-12-15)
Day-Ray Products Inc 1133 Mission St South
Pasadena Calif (8)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (10)
Dixie Controller Inc Post Office Box 5844 Birmingham 9 Aia (13)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza
South Long Island City 1 NY (1)
Easy-Heat Inc 555 N Michigan St Lakevitle
Ind (7)
Ebert Electronics Corp 212-26 Jamanica Ave Ouens Ind (7)
Ebert Electronics Corp. 212-26 Jamaica Ave. Queens
Village 28 Ll. NY (9)
Edoc. International Corp. 20722 W Seven Mile Rd.
Detroit 19 Mich (1)
Ederer Engineering Co. 2943 1st Ave. S. Seattle 4
Wash (12) Wash (12)

Edwards Co Inc Norwalk Conn (3)

Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (6)

Electric Power Door Co Inc 2127 E Lake St Minneapolis 7 Minn (3)

Electric Service Systems Inc 1330 Quincy St N E Minneapolis 13 Minn (4)

Electronic Control Corp 15341 Dale Detroit 23 Minch (3) Electronic (Mich (3) Mich (3)

Blectronics Corp of America One Memorial Dr
Cambridge Mass (3-9)

Electrovector Inc 475 Flushing Ave Brooklyn 5 Cambridge Mass (3-9)
Electrovector Inc 475 Flushing Ave Brooklyn 5
NY (7)
Engelhard Industries Inc Industrial Equipment Div
Instruments & Systems Sec 859 Passaic Ave
East Newark NJ (7)
Exide Industrial Div Electric Storage Battery Co
Rising Sun & Adams Ave (P 0 Box 5723)
Philadelphia 20 Pa (2)
Federal Pacific Electric Co 50 Paris St Newark 5
NI (7) N.J. (1)
Fennal Inc Pleasant St Ashland Mass (7)
Fisher-Pierce Co 170 Pearl St South Braintree 85
Mass (9)
Friez Instrument Div Bendix Aviation Corp Baltimore 4 Md (7)
Futton Sylphon Div Robertshaw-Fuiton Controls Co
Box 400 Knoxville 1 Tenn (7)
General Controls Co 801 Allen Ave Glendale
Calif (7)
General Electric Co Apparatus Sales Schenectadus General al Electric Co Apparatus Sales Schenectady NY (2-5-6-7-9-10-11) S NY (2-5-6-7-9-10-11)

General Electric Co Circuit Protective Devices Dept
41 Woodford Ave Plainville Conn (2)

General Electric Co Wiring Device Dept 95 Hathaway St Providence R1 (1-7)

Guardian Electric Mfg Co 1550 W Carroll Ave

Chicago 7 Ill (1)

H-B Instrument Co American & Bristol Sts Philadelphia 40 Pa (7-9)

Hankscraft Co Control Div Reedsburg Wis (7)

Harnischeger Corp 4400 W National Ave Milwaukee 46 Wis (12)

Hart Mfg Co 164 Bartholomew Ave Hartford waukee 46 Wis (12)
Hart Mfg Co 164 Bartholomew Ave Hartford
Conn (7)
Howeli Mfg Co 21 N Morehall Rd Paoli Pa (3)
HUBBELL (HARVEY) INC State St & Bostwick
Ave Bridgeport 2 Conn (1)—ADV PG 125
Hughes Aircraft Co Vacuum Tube Products Div
2020 Short St Occanside Calif (11)
Ideal Electric and Mfg Co East First St Mansfield
Ohio (6) Ideal Electric and Mfg Co East First St Mansfield Ohio (6)
Illinois Testing Laboratories Inc 420 N LaSalle St Chicago 10 III (7)
Industrial Electric Switches of Indiana New Augusta Ind (11)
International Electric Fence Co Inc Box 650 Albert Lea Minn (4)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III (9)
Kato Engineering Co 1442 First Ave Mankato Minn (6)
Knox Porcelain Corp 2706 Mynders Ave (P O Minn (6)
Knox Porcelain Corp 2706 Mynders Ave (P 0
Box 2031) Knoxville 1 Tenn (2)
Kulka Electric Corp 633 S Fulton Ave Mount
Vernon NY (8)
Lake Shore Electric Corp 205 Willis St Bedford
Ohio (6)
Leach Corp 18435 Susana Rd Compton Calif
(6-8) (6-8)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1-2)
Lincoin Electric Co 22801 St Clair Ave Cleveland 17 Ohio (11)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (9)
Magnetrol Inc 2110 S Marshall Blvd Chicago 23 (II (1.5)
Marquette Electric Switchboard Co 311 N Desplaines
St Chicago 6 III (6)
Marsh Instrument Co 3501 Howard St Skokie
III (7)

Memco Engineering & Mfg Co Inc Commack L! NY (10) Mercoid Corp 4201 W Beimont Ave Chicago 41 III (7)
Micro Switch Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport III (1)
Minneapolis-Honeywell Regulator Co 2753 Fourth
Ave S Minneapolis B Minn (7-8)
Minneapolis-Honeywell Regulator Co Boston Div 40
Life St Boston 35 Mass (7)
Minneapolis-Honeywell Regulator Co Industrial Div
Wayne & Windrim Aves Phila 44 Pa (7)
Modernheat Cable Corp P 0 Box 754 Kingsport
Tenn (7)
National Cathode Corp. 317 F 34 St New York 16 National ational Cathode Corp 317 E 34 St New York 16 NY (8) Palmer Electric & Mfg Co 24 Water St Wakefield Mass (7) Partlow Corp 230 Campion Rd New Hartford NY (7) (7)
Peass & Seymour Inc Syracuse 9 NY (1)
Penn Controls Inc Goshen Ind (7)
Precision Thermometer & Instrument Co 1434
Brandywine St Philadelphia 30 Pa (7)
Progress Mfg Co Inc Castor Ave & Tulip St Philadelphia 34 Pa (8)
Quincy Mfg Co Box 916 Tiffin Ohio (3)
Rhodes (M H) Inc 30 Bartholomew Ave Hartford
6 Conn (1)
Richards-Wilcox Mfg Co 150 Third St Aurora
III (3) Ripley Co Inc Factory St Middletown Conn (9) Roberson Inc 1539 E 103 St Seattle 55 Wash (7) Robot Industries Inc 7041 Orchard St Dearborn Mich (3) Mich (3)
Mich (11)
Mich (1 NY (1)
Scalco Controls Inc P O Box 41 Delanco NJ (7)
Shox-Stok Inc Wellington Ohio (4)
Siegler Corp Magnetic Amplifiers Div 632 Tinton
Ave New York 55 NY (2-6-8)
Signet Controls 3205 S E 13th Ave Portland 2
Ore (7) Ore (7)

Simplex Co Inc. 1139-41 N MacArthur Blvd Springfield III (6)

Slater Electric & Mfg Co Inc. 45 Sea Cliff Ave. Glen
Cove. NV (1)

Smith-Gates Corp. Farmington. Conn. (7)

Square D Co. Executive Plaza. Park. Ridge. III. (8)

Stackpole Carbon Co. Stackpole St. St. Marys. Pa.

(1) (1) Sunwarm Inc 1601 Jared Dr (P 0 Box 266) Kingsport Tenn (7) Superior Electric Co 83 Laurel St Bristol Conn (8)
Swan Mfg Co 1801 W 26 St Vancouver Wash (7)
Taylor-Winfield Corp 1052 Mahoning Ave N W
Warren Ohio (11)
Thermolyne Corp 513 Huff St Dubuque Iowa (7)
Tocco Div Ohio Crankshift Co 3800 Harvard Ave
Cleveland 5 Ohio (6)
Trine Mfg Corp 1430 Ferris PI New York 61 NY (3) Ulanet (G NJ (7) (George) Co 413-15 Market St Newark 5 Ulanet (George) Co 413-15 Market St Newark 5 NJ (7)
United Electric Controls Co 85 School St Watertown 72 Mass (7)
Velotron Inc 1186 Broadway New York 1 NY (7)
Ward Leonard Electric Co 28 South St Mount
Vernon NY (8)
Waukesha Motor Co Waukesha Wis (6)
Waukesha Motor Co Waukesha Wis (6)
Waukesha Motor Co Waukesha Wis (6)
Wakesha Motor Co 1950 W Eight Mile Rd Detroit 41
Mich (6-11)
West Instrument Corp 390 First St San Francisco 5 Calif (7)
West Instrument Corp 4363 W Montrose Ave Chicago 41 III (7)
Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa (1-6 thru 13)
Mo (7) White-Rod Mo (7) Yardney Electric Corp 40-50 Leonard St New York 13 NY (7)

#### 3K SPECIAL-FUNCTION CONTROLS

1. Field-discharge switches
2. Frequency controls
3. Interlocks & electric locks
4. Magnetic amplifiers
5. Program clock systems
6. Saturable reactors
7. Servo components
8. Solenoids
9. Static controls
10. Electric brakes & clutches
11. Valves (electrically operated)
12. Carrier system controls
13. Machine & process controls
14. Permanent magnets
15. Peak load controls
16. Electromagnets
17. Central industrial control systems
18. Flame safeauard equioment
19. Rotary switches, industrial
20. Stepping switches
21. Level-indicating systems
22. Infrared detector controls Field-discharge switches

McLarty Systems 2600 Dickman Rd Battle Creek Mich (7)

McCorkle (1)

(D H) Co Box 97 Station A Berkeley

Devices intended to accomplish specialized control functions.

Acme Electric Corp 45 Water St. Cuba NY (6)
Acro Switch Div Robertshaw-Fulton Controls Co
2040 E Main St. Columbus 16 Ohio (15)
Allen-Bradley Co 136 W Greenfield Ave
4 Wis (8)
Allis (Louis) Co 427 East Stewart St.
1 Wis (2)
Allis-Chalmers Mfg Co 930 S 70th St.
Wis (2-4-6-7-9-11)
American Rectifier Corp 95 Lafayette St. NY 13
NY (10) NY (20)
American-Standard Controls Div 5900 Trumbull
Ave Detroit 8 Mich (11)
Althomatic Valve Co Inc 345 W Abbott St
apolls Ind (11)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (5)
Automatic Control Co 995 University Ave St Paul
4 Minn (5-7)
Automatic Devices Div American Machine & Metals
Inc Sellersville Pa (5)
Automatic Switch Co 50-56 Hanover Rd
Pk NJ (1-8-11)
Automatic Finning & Controls Inc King of Prussia NY (10)

Pa (5-13-17) & Controls Inc King of Prussia Pa (5-13-17) B/W Controller Corp 2200 E Maple Rd Birming-ham Mich (8) Barkelew Electric Mfg Co 1905 Columbia Ave Middletown Ohlo (1) Valves 5125 Alcoa Ave Los Angeles 58

Barksdale Va Calif (11) Berkshire Tra Calif (11)

Berkshire Transformer Corp Kent Conn (6)

Bogue Electric Mfg Co 52 Iowa Ave Paterson 3

NJ (4-7)

Frach Mfg Corp 200 Central Ave Newark 3

NJ

(4)

(4)

Bush Transformer Corp 707 North St Endicott NY (6)

NY (6)
Caltron Products Co 3518 W Pico Blvd Los Angeles 19 Calif (8-11)
Central Transformer Co 900 W Jackson Blvd Chicago 7 III (6)
Cincinnati Time Recorder Co 1733 Central Ave Cincinnati 14 Ohio (5)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (11-13)
Comar Electric Co 3349 W Addison Chicago 18 III (8)
Controls Co of America Control Switch Day

Comar Electric Co 3349 W Addison Chicago 18 III (8)
Controls Co of America Control Switch Div 1420 Delmar Dr Folcroft Pa (3)
Controls Co of America 2450 N 32 St Milwaukee 45 Wis (8-11)
Counter & Control Corp 4503 W Brown Deer Rd Milwaukee 23 Wis (5)
Crittenden Transformer Works Inc. 13011 S Spring St Los Angeles 61 Calif (6)
Crucible Steel Co of America Oliver Bidg Mellon Sq Pittsburgh 22 Pa (14)
Cutler-Hammer Inc. 228 N 12th St Milwaukee 1 Wis (3-4-5-8-9-0-11-112-13)
Delta-Star Electric Div H K Porter Co Inc. 2437 Fulton St Chicago 12 III (3)
DeWalt Inc Fountain Ave Lancaster Pa (10)
Dings Brakes Inc. 4740 W Electric Ave Milwaukee 46 Wis (10)
Dixic Controller Inc. Post Office Box 5844 Birmingham 9 Ala (13-17)
Deromyer Industries 3418 Milwaukee Ave Chicago 47 III (4-6-9)
Dormeyer Industries 3418 Milwaukee Ave Chicago 41 III (6-8)
Dossert Mig Corp. 249-255 Huron St Brooklyn 22

Ave Dormeyer Industries 3418 Milmanum. 111 (6-8)
41 III (6-8)
Dossert Mig Corp 249-255 Huron St Brooklyn 22
NY (3)
NY (3)
Linearize Div Eaton Mig Co 3122 14th Ave

Div Eaton Mfg Co 3122 14th Ave Wis (10) neering Co 2943 1st Ave S Seattle 4 Ederer Engineering CO 2745 ASE AVE Wash (10) Edwards Co Inc Norwalk Conn (5) Electran Mfg Co 1901 Clybourn Ave Chicago 14

Electrica Windings Inc 2015 N Kolmar Ave Chi-cago 39 III (6) []] (6)

Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 III (6)
Electro Engineering Works 401 Preda St San Leandro Calif (6)
Electronic Corp of America One Memorial Dr Cambridge Mass (3)
Faraday Inc 2011 W Beecher Rd Adrian Mich (5)
Federal Sign & Signal Corp 13626 S Western Ave Blue Island III (5)
Fischer & Forter Co 335 Warminster Rd Hatboro Pa (11)
Futton Sylphon Div Robertshaw-Fulton Control College Control College (12)

Pa (11)
Futon Sylphon Div Robertshaw-Fulton Controls Co
Box 400 Knoxville 1 Tenn (11)
Gemoc Electric Co 25685 W Eight Mile Rd Detrolt
40 Mich (4-6-7)
General Controls Co 801 Allen Ave Glendale
Calif (8-11)

Calif (8-11)

General Electric Co Apparatus Sales Schenectady 5
NY (1 thru 4—6 thru 10)

General Hardware Mfg Co Inc 80 White St New
York 13 NY (14)

Guardian Electric Mfg Co 1550 W Carroll Ave
Chicago 7 III (8-11)

Hankscraft Co Control Div Reedsburg Wis (15)

Harder (100-14 Ch Co 2500 Mc Control Con

Co Control Div Reedsburg Wis (15)
nald C≽ Co 2580 K St San Diego 2 Calif (4)

Calif (4)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (10)
Hays Mfg Co Automatic Controls Dlv 12th and
Liberty Sts Erie 6 Pa (3-8-11)
Hevi Duty Electric Co 3002 W Burleigh St (P 0
Box 563) Milwaukee 1 Wis (6)
Hewson Co Inc 115 Maple St Summit NJ (9)
IM^ Magnetics Corp 570 Main St Westbury NY
(7)

I-T-E Circuit Breaker Co Greensburg Div P 0 Box 98 Greensburg Pa (3) International Business Machines Corp Times Equip-ment Div 590 Madison Ave New York 22 NY (5-12)

(5-12)

INTERNATIONAL REGISTER CO 2620 W Washington Blvd Chicago 12 III (5)—ADV PG 99

Laurence (R G) Co Inc 122 Summit St Tenafly urence (R NJ (8-11) 18435 Susana Rd Compton Calif Leach (4-9) Ledex Inc 123 Webster St Dayton 2 Ohio (8-19-20) Leeds & Northrup Co 4970 Stenton Ave Phila 44 Pa (2-6) ra (2-6)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 III (6)
Lumen Inc Moen Ave (P 0 Box 905) Joliet III (4)
Magnatrol Valve Corp 67 Fifth Ave Hawthorne NJ
(11)

(11)
Magnetics Inc. Box 391 Butler Pa (4-6-9)
Manning Maxwell & Moore Inc. 250 E Main St
Stratford Conn (11)
Max-A-Loc Inc. El Monte Calif (3)
Mercoid Corp. 4201 W Belmont Ave. Chicago. 41
III (11)

III (11)
Inneapolis-Honeywell Regulator Co
Ave S Minneapolis 8 Minn (5)
Inneapolis-Honeywell Regulator Co
Wayne & Windrim Aves Phila 44 Pa (2-7-11-13-17-18)

13-17-18)

National Acme Co Electrical Controls Div 170 E 131 St Cieveland 8 Ohio (8)

National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (5)

Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY (8)

Nothelfer Winding Labs Inc 220 Ewingville Rd (P O 80x 455) Trenton 3 NJ (6)

Oviatt (O C) Co 2174 Lakeside Ave Cleveland 14 Ohio (13)

Panellit Div ISI Inc 7401 N Hamlin Ave Skokie III (17)

Permanent Magnet Co Inc 4432 Reactor St.

Panellt DIV 151 Inc 7401 N Hamlin Ave Skokie III (17)
Permanent Magnet Co Inc 4437 Bragdon St Lawrence 26 Ind (14)
Phillips Mfg Co Inc 8200 Grand Ave Minneapolis 20 Minn (8)
Protection Controls Inc 6000 N Legett Ave Chicago 46 III (13)
R & IE Equipment Div I-T-E Circuit Breaker Co Greensburg Pa (3)
Raytheon Mfg Co Commercial Apparatus & Systems Div 100 River St Waltham 54 Mass (4)
Refrigerating Specialties Co 3004 W Lexington St Chicago 12 III (11)
PRELIANCE ELECTRIC & ENGINEERING CO 24701
Euclid Ave Circuit Apparatus & Control Control

Reuland Electric Co 3001 W Mission Rd Alhambra Calif (10) Richardson-Allen Corp 116-15 Fifteenth Ave Col-lege Point LI NY (6)

oss Operating Valve Co 120 E Golden Gate Ave Detroit 3 Mich (11) ngemann Mfg Co Foster Court Salem Ruggles-Kline Mass (11) Russell & Stoll Co Inc 125 Barclay St NY 7 NY

Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn (10)

Shrader (FW) Co 11623 S Broadway Los Angeles 61 Calif (14-16)

Siegler Corp Magnetic Amplifiers Div 632 Tinton Ave New York 55 Ny (4-6-7-11)

Simplex Time Recorder Co 24 S Lincoln St Gardner Mass (5)

Skinner Precision Industries Inc Skinner Electric Valve Div 95 Edgewood Ave New Britain Conn (11)

SORGEL ELECTRIC CO 838B W National Ave Mil-

SORGEL ELECTRIC CO 8388 W National Ave Mills Waukee 4 Wis (6)—ADV PG 115
Square D Co Executive Plaza Park Ridge III (9)
Southwestern Industrial Electronics Co 10201 Westheimer (P 0 Box 22187) Houston 27 Tex (4-6)
Stackpole Carbon Co Stackpole St St Marys Pa
(14) Standard Electric Time Co 89 Logan St Springfield 2 Mass (5)

2 Mass (5)
Steams Electric Corp 120 N Broadway Milwaukee
2 Wis (10)
Stonite Coil Corp US Hwy 130 Yardville NJ (8)
Stromberg Div General Time Corp 135 S Main
St Thomaston Conn (5)
Superior Electric Co 83 Laurel St Bristol Conn (4)

Superior Interlock Corp 73-39 Central Ave Glen-dale 27 NY (3)

dale 27 NY (3)

Supreme Electric Products Co 194 Vassar St Rochester 7 NY (11)

Taylor-Winfield Corp 1052 Mahoning Ave NW Warren Ohio (11)

Trio Laboratories Inc Expressway Industrial Park Plainview NY (3)

Trombetta Solenoid Corp 329 N Milwaukee St Milwaukee 2 Wis (8)

Turbo Machine Co Lansdale Pa (13)

United States Electronics Corp 275 Warren St Lyndhurst NJ (8)

United Tates Electronics Corp 275 Warren St Lyndhurst NJ (8)

United Transformer Co 150 Varick St New York 13 NY (6) 13 NY (6)
Versabar Corp 14 Whyte St Jersey City NJ (10)
Vickers Inc Electric Products Div 1847 Locust St
St Louis 3 Mo (4-10)
Viking Instruments Inc East Haddam Conn (11)
Weltronic Co 19500 W Eight Mile Rd Detroit 41
Mich (2-3)

Werner Electric Brake & Clutch Co Beloit Wisc (10)

Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (1 thru 4—6 thru 14-16-17) White-Rodgers Co 9797 Reavis Rd St Louis 23 Mo (11)

Mo (11)
Wisconsin Electrical Mfg Co Inc 1237 S Third St
Milwaukee 4 Wis (13)

ZENITH ELECTRIC CO 155 W Walton St Chicago
10 III (5)—ADV PG 114

#### 3L. LOW-VOLTAGE CONTROL SYSTEMS

Low-voltage relays, switches and power sources for control of lighting and appliance loads from multiple locations.

Amprobe Instrument Corp 630 Merrick Rd Lyn-brook NY brook NY

Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI
Sierra Electric Corp 15100 S Figueroa St (P 0
Box 85) Gardena Calif
Touch-Plate Mfg Corp Box 1970 Long Beach Calif

#### 3M. MOTOR CONTROLS

Disconnect switches
 Drum switches & controllers
 Magnetic contactors
 Magnetic starters
 Manual starters
 Pushbutton stations
 Speed regulators & controls
 Mator control centers
 Starters, explosion-proof
 Pushbutton stations, oiltight

Starting, stopping and control equipment for motor circuits.

Acme Electric Corp 45 Water St Cuba NY (7)
Adam (Frank) Electric Ca 3647 Windsor PI St
Louis Mo (1)
Allen-Bradley Co 136 W Greenfield Ave Milwaukee
4 Wis (1 thru 7)
ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee
1 Wis (2-3-4-5-6-7)—ADV FG 74-75
American Electric Switch Div Clark Controller Co
1146 E 152 St Cleveland 10 Ohio (1)
American Rectifier Corp 95 Lafayette St NY 13
NY (7)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn

nY (7)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn
St Hartford 6 Conn (1-2-3-4-5-6)
Automatic Control Co 995 University Ave St
Paul 4 Minn (8)

Paul 4 Minn (8)

AUTOMATIC SWITCH CO 50-56 Harower Rd Florham Pk NJ (3)—ADV PG 71

Automatic Timing & Controls Inc King of Prussia
Pa (8)

B/W Controller Corp 2200 E Maple Rd Birmingham Mich (3-4)

Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (7)

Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (5)

Clark Controller Co 1146 E 152 St Cleveland 10

Ohio (2-3-4-5-6-7)

Continental Electric Equipment Co Box 1055 Cin-

Unio (2-3-4-3-6-7)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (8)
Crouse-Hinds Co Syracuse 1 NY (3-4-5-6)
Curtis Development & Mfg Co 3244 N 33 St Milwaukee 16 Wis (7)
Cutter Moreover Inc. 238 N 1285 St Atlantace

waukee 16 Wis (7)

Viler-Hammer Inc 228 N 12th St Milwaukee 1

Wis (1-2-3-4-5-6-7-8) Wis (1-2-3-4-5-6-7-8)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (4)
Delta-Star Electric Div H K Povter Co Inc 2437
Fulton St Chicago 12 III (1)
Electric Distribution Products Inc 2200 31st St SW
Allentown Pa (8)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (4-7)
Electric Regulator Corp Norwalk Conn (7)
Eliza Metal Products Co Box 408 Bridgeville Pa
(6)

(6)
Empire Switchboard Co Inc 810 Fourth Ave Brooklym 32 NY (8)
Euclid Electric & Mfg Co 50 Edwards St Madison
Ohio (2-5-4-6)
FEDERAL PACIFIC ELECTRIC CO 50 Paris St
Newark 5 NJ (2-3-4-5-6)—ADV PG 105
FURNAS ELECTRIC CO 1067 McKee St Batavia
III (2-3-4-5-6)—ADV PG 92
Gemco Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (4-6-7)
General Control Co 1200 Soldiers Field Rd Boston
34 Mass (6) Mass (6)
| Controls Co 801 Allen Ave Glendale Calif

(3-4)
General Electric Co
5 NY (1 thru 8)
General Electric Co
41 Woodford Ave
Plainville Conn (8)
General Electric Co
41 Woodford Ave
Plainville Conn (1 thru 8)

GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Comn (1 thru 8)—ADV PG Switch Co 45 Roebling St Brooklyn 11

General Switch Co 45 Roebling St Brooklyn 11
NY (1)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1 thru 7)—ADV PG 2
Grayhil Inc 551 Hillgrove Ave La Grange III (6)
1-1-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (1)
1-1-E Circuit Breaker Co BuilDog Electric Products
Div 7610 Jos Campau Detroit Mich (1)
1-1-E Circuit Breaker Co Greensburg Div P 0 Box
98 Greensburg Pa (1)
Ideal Electric and Mfg Co East First St Mansfield
Ohio (2-4-5)
KILLARK ELECTRIC MFG CO 3940 Easton Ave
St Louis 13 Mg (1-3-4-5-6)—ADV PG 78-79
Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio (5)
Kolton Electric Mfg Co 123 New Jersey Railroad
Ave Newark 5 NJ (1)
Leonard Electric Control Corp 384 Canal St New
York 13 NY (2)
Link-Beit Co 1700 Prudential Plaza Chicago 1
III (7)
Lumenite Electronic Corp 407 S Dearborn St Chi-

III (7) Lumenite Electronic Corp 407 S Dearborn St Chicago 5 III (3) Machinery Electrication Inc 56 Hudson St Northboro Mass (7) Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 NY (1) Minneapolis-Honeywell Regulator Co Ave 5 Minneapolis 8 Minn (6) Monitor Controller Div Atlee Corp 99 Grove St Rockland Mass (1-3-45-6) Manueraw Mfg Corp 1250 Atlantic Ave Brooklyn 16

National Acme Co Electrical Controls Div 170 E 131st St Cleveland 8 Ohio (5-6) Nelson Electric Mfg Co P O Box 5385 Tulsa Okla

(3-4-6-8) Opad Electric So 43 Walker St New York 13 NY (7) Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1)

Mass (1)
Pyle-National Co 1344 N Kostner Ave Chicago
51 II (1-4-6-9)
Queen Products Co Inc Thirteenth & Rowan Sts
Louisville 3 Ky (10)
R-B-M Controls Div Essex Wire Corp 131 Godfrey
St Logansport Ind (3-4)

St Logansport Ind (3-4)
St Logansport Ind (3-4)
Rees (Machworth G) Inc 1573 E Forest Ave Detroit 7 Mich (6)
Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (7)
Richards-Wilcox Mfg Co 150 Third St Aurora III
(6)

Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1-4-5-6)

Servospeed Div Electro Devices Inc 4 Godwin Ave Paterson NJ (7)

Paterson NJ (7)
Siegler Corp Magnetic Amplifiers Div 632 Tinton
Ave New York 55 NY (7)
Square D Co Executive Plaza Park Ridge III
(1 thur 7)
Square D Co Electric Controller & Mfg Div 4493
Lee Rd Cleveland 28 Ohio (3-4)
Struthers-Dunn Inc Pitman NJ (4)
Superior Electric Co 83 Laurel St Bristol Conn
(7)

System Analyzer Corp 700 W State St Nokomis III (3)

System Analyser on Fill (3)
U.S. Electrical Motors Inc. 200 E. Slauson Ave. Los. Angeles 54. Calif (7)
Vickers Inc. Tulsa Products Div. 731 E. First St. Tulsa 20. Okla (7)
Wac Line Inc. 35 S. St. Clair St. Dayton 2. Ohio. (7)

(7)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St
(Box 272) Covington Ky (1)
Ward Leonard Electric Co 28 South St Mount
Vernon NY (3-46-7)
Weltronic Co 19500 W Eight Mile Rd Detroit 41
Mich (7)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (8)
WESTINCHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (12-3-4-5-6-7)—ADV PG 2nd Gover
Winterburn Mfg Co P 0 Box 386 Putnam Conn
(7)

(7)
EZEMITH ELECTRIC CO 155 W Walton St Chicago
10 III (3-4)—ADV PG 114
Zinsco Electrical Products 729 Turner Los Angeles
12 Calif (8)

#### 3N. RELAYS

General purpose
 Protective
 Timing & time delay
 Rotary
 Motor-starting
 Electronic
 Miniature

General purpose relays include magnetic and mechanically held types for remote switch-ing of electrical circuits. Protective relays include overload, thermal, undervoltage, phase rotation, etc., relays.

Abrams Instrument Corp. 606 E Shiawasee St. Lansing Mich. (3)
Acro Switch Div. Robertshaw-Fulton Controls Co. 2040 E Main St. Columbus 16. Ohio (1)
Aemoo Inc. 10 State St. Mankato Mino (1)
Airserco Mrg. Co. Inc. 435 Melwood St. Pittsburgh. 13. Pa. (1)

Aitken-Reed Inc 2802 Wollmer St Manitowac Wis (1-3)

Aitken-Reed Inc 2802 Wollimer St Manitowac Wiis (1-3)
Allors Mig Co 1140 S Seventh St De Kalb III (1)
Alien-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wiis (1-2-3)
Allors Mig (1-2-3)
Allors Mig (1-2-3)
Amperite Co Inc 561 Broadway NY 12 NY (3)
Arrow-Hart & Hegeman Electric Co 103 Mawthorn St Hartford 6 Conn (1)
Autocall Co 58 Warden Ave Shelby Ohio (1)
Automatic Electric Co Northlake III (1-3)
Automatic Electric Co Northlake III (1-3)
Automatic Timing & Controls Inc King of Prussia Ps (3)
B/W Controller Corp 2200 E Mapie Rd Birmingham Mich (2-6)
Bristol Motor Div Vocaline Co of America Inc Coulter St Old Saybrook Conn (3)
Clare (C P) & Co 3101 Pratt Blvd Chicago 45
III (1)
Clark Controller Co 1146 E 152 St Cleveland 10
Ohio (1-2-3)
Comar Electric Co 3349 W Addison Chicago 18
III (1)
Cramer Controls Corp Main St Centerbrook Conn (3)

Cramer Controls Corp Main St Centerbrook Conn (3)

Cutler-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-2-3)
Daystrom Inc Weston Instruments Div 614 Frelinghuysen Ave Newark 12 NJ (1)
Ebert Electronics Corp 212-26 Jamaica Ave Queens
Village 28 LI NV (1)
Elastic Stop Nut Corp of America Elizabeth Div
1027 Newark Ave Elizabeth NJ (3)
Elgin National Watch Co Electronics Div 2435 N
Naomi St Burbank Calif (1-4)
Euclid Electric & Mfg Co 50 Edwards St Madison
Ohlo (1-3)
Farmer Electric Products Co Inc 2300 Washington

Farmer Electric Products Co Inc 2300 Washington St Newton Lower Falls 62 Mass (1) Federal Pacific Electric Co 50 Paris St Newark 5

General Controls Co 801 Allen Ave Glendale Calif (1)
General Electric Co Apparatus Sales Schenectady
5 NY (1-2-3)
Guardian Electric Mfg Co 1550 W Carroll Ave
Chicago 7 III (1)
H-8 Instrument Co American & Bristol Sts Philadelphia 40 Pa (1)
Haledy Electronics Co 57 William St NY 5 NY
(1)

Hankscraft Co Control Div Reedsburg Wis (1) Haydon (A W) Co 232 N Elm St Waterbury Conn (3)

(3)
Haydon (A W) Co 4060 Ince Blvd Culver City Calif (3)
Haydon Div General Time Corp 245 E Elm St. Torrington Conn (3)
Heinemann Electric Co Pennsylvania Ave & Plum St. Trenton 2 NJ (2-3)
Iron Fireman Mfg Co Electronics Div 2838 S E. 9th Ave. Portland 2 Ore (1)
Jordan Electronics 121 S Palm Ave. Alambra. Calif (3)
Konnan Electric Co. 301-103 News St. Brooklyn.

Kurman Electric Co 191-193 Newel St Brooklyn 22 NY (1-2-3) Leach Corp 18435 Susana Rd Compton Calif (1-2-3-4)

Lewus Electric Co 1254 W Harrison St Chicago 7

III (1)
Line Electric Co 229 River St Orange NJ (3)
Lunenite Electronic Corp 407 S Dearborn St Chicago 5 III (3)
Machinery Electrification Inc 56 Hudson St Northborn Mass (2-3)
Mercoid Corp 4201 W Belmont Ave Chicago 41
III (1)
Metals & Controls (3)

Metals & Controls Inc 34 Forest St Attleboro Mass (5)

Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (1-3)

Naybor (E V) Laboratories Inc 26 Manorhaven Blvd Port Washington NY (1-3)

Nelson Electric Mfg Co P O Box 5385 Tulsa Okla (3)

Ohmite Mfg Co 3601 Howard St Skokle III (1-2)

Palmer Electric & Mfg Co 24 Water St Wakefield Mass (1)

Partrick & Wilkins Co 51 N Seventh St Phila 6

Partrick & Wilkins Co 51 N Seventh St Phila 6 Pa (1) Penn Controls Inc Goshen Ind (1) Phillips Control Corp 59 W Washington St Joliet Phillips (

Pollak (Joseph) Corp 81-95 Freeport St Boston 22 Mass (1)

Potter & Brumfield Div American Machine and Foundry Co Princeton Ind (1) Foundry Co Princeton Ind (1)
Price Electric Corp East Church & Second Sts Frederick Md (1)
R-B-M Controls Div Essex Wire Corp 131 Godfrey St Logansport Ind (1)
Rhodes (M H) Inc 30 Bartholomew Ave Hartford 6 Conn (3)
Square D Co Executive Plaza Park Ridge III (1-2-3)

Standard Electrical Products Co 2240 E Third St Dayton 3 Ohio (1-2-3)

Stradley Engineering Co P 0 Box 6006 Pittsburgh
11 Pa (2)
Struthers-Dunn Inc Pitman NJ (1-3)
Sylvania Electric Products Inc 730 Third Ave New
York 19 NY (3)
Taitco Div Tait Mfg Co 500 Webster St Dayton
1 Ohio (1)
Terado Co 1068 Raymond Ave St Paul 14 Minn
(7)

Touch-Plate Mfg Corp Box 1970 Long Beach Calif

Ulanet (George) Co 413-15 Market St Newark 5 NJ (3) Ward Leonard Electric Co 28 South St Mount Vernon NY (1) Webster Electric Co 1900 Clark St Racine Wis (3)

Wesix Electric Heater Co 390 First St San Fran-cisco 5 Calif (1) Westinghouse Electric Corp Standard Control Div Beaver Pa (1-2-3)

Beaver Pa (1-2-3)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2-3)

ADV PG 2nd cover

Wheelock Signals Inc Branchport Ave Long Branch NJ (1)

White-Rodgers Co 9797 Reavis Rd St Louis 23 Mo (1) Wilson (G C) & Co 1915 Eighth Ave Huntington W Va (3)

Zenith Electric Co 155 W Walton St Chicago 10 III (3)

#### 3P SYSTEM REGULATING EQUIPMENT

Capacitors
 Rheostats
 Voltage regulators
 Load resistors
 Varistors
 Thermistors

7. Arc suppressors

Capacitors are for power factor control; resistances & rheostats are for control of voltage & current in circuits to motors, elevators, plating equipment, etc.; voltage regulators control voltage of transmission lines, feeders or specific utilization equipment. Varistors are voltage-sensitive resistors; thermistors are thermally sensitive resistors.

Acme Electric Corp. 45 Water St. Cuba. NY (3) Allen-Bradley Co. 136 W Greenfield Ave. Milwaukee 4 Wis (2) mers Mfg Co 930 S 70th St Milwaukee 1 Wis (3) American Rectifier Corp 95 Lafayette St New York American Rectiner Corp. 95 Larayette St. New York
13 NY (3)

Bogue Electric Mfg Co. 52 lowa Ave. Paterson 3
NJ (3) NJ. (3)

Bradley Semiconductor Corp. 275 Walton St. New Haven 11 Conn. (7)

Central Transformer Co. 900 W Jackson Blvd. Chicago 7. III. (3).

Columbia Electric. Mfg. Co. 4519 Hamilton Ave. Cleveland 14. Ohio. (2).

Continental-Wirt. Electronics. Corp. 26. W. Queen. Lane. Philadelphia. 44. Pa. (2).

Place. Niv. Biografieric. Engineering. Co. 1933. N. Damen. Philadelphia. 44. Pa. (2).

Lane Philadelphia 44 Pa (2)
Djeco Div Djordjevic Engineering Co 1933 N Damen
Ave Chicago 47 III (3)
Electronic Measurements Co Inc Lewis St & Maple
Ave Eatontown NJ (3)
Exmet Corp 127 Marbledale Rd (P 0 Box 485)
Tuckahoe NY (4)
FEDERAL PACIFIC ELECTRIC CO 50 Paris St
Newark 5 NJ (1)—ADV PG 105
General Electric Co Apparatus Sales Schenectady
5 NY (1-2-3-6)
Girard-Mopkins 1000 40th Ave Oakland 1 Calif

d-Hopkins 1000 40th Ave Oakland 1 Calif (1) (1) Globar Plant (Refractories Div) Carborundum Co Niagara Falis NY (4-5-6) Guyan Machinery Co Inc Box 150 Logan W Va

(2-4) Keystone Carbon Co Inc 1935 State St St Marys Pa (6) Lake Shore Electric Corp 205 Willis St Bedford Ohio (3)

Unio (3)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1-3)
Mallory (P R) & Co Inc 30 S Gray St Indianapolis
6 Ind (2)

National Electric Controller Co 7070 Glenwood Ave Chicago 26 III (2)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Ohio Brass Co 380 N Main St Mansfield Ohio (1)
Box 330 Canonsburg Pa (3)
Railroad Accessories Corp Tenakill Park Cresskill NJ (2-4)
Raytheon Mig Co Commercial Apparatus & Systems
Div 100 River St Waltham 54 Mass (3)
Safety Electrical Equipment Corp 1187 Diswell
Ave New Haven Conn (3)
Sangamo Electric Co 11th & Converse Springfield
III (1)

111 (1)
Shallcross Mfg Co Preston St Selma NC (4)
Simplex Co Inc. 1139-41 N MacArthur Bivd Springfield III (3)
Sorensen & Co Inc Richards Ave South Norwalk
Springer Electric Co.

Sprague Electric Co North Adams Mass (1) Stackpole Carbon Co Stackpole St St Marys Pa

Superior Electric Co 83 Laurel St Bristol Cone (2-3) Tobe Deutschmann Corp Providence Highway Nor-wood Mass (1) wood Mass (1)
Ward Leonard Electric Co 28 South St Mount
Vermon NY (2-4)
Weltronic Co 19500 W Eight Mile Rd Detroit 41 Westinghouse Electric Corp P O Box 2278 Pitts-

burgh 30 Pa (1-3)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2-3)—ADV PG 2nd cover

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
3-1	Electrical Switches; 10p (Alcor)
3-2	Time Controls; 50p; Cat. No. T-100 (Automatic Timing)
3-3	Photoelectric and Other Electronic Controls; 23p; Cat. No. 60 (Autotron)
3-4	Solenoid Air Valves; 12p; Cat. No. 601021 (Barksdale)
3-5	Standard Valves; 23p; Cat. No. 60-61 (Barksdale)
3-6	Relays; 41p; Cat. No. 61 (Comar)
3-7	Brakes & Clutches; 15p; Cat. No. GB-5 (Dynamatic)
3-8	Liquid Cooled Adjustable Speed Drive; 11p; Cat. No. DD-1 (Dynamatic)
3-9	Instrument and Control Switches; 12p; Cat. No. 6055-IN (Electro Switch)

3-11	Electrical Control & Distribution Equip- ment; 29p (Empire)	3-31	Industrial Enclosed Switches; 19p; Cat. No. 83e (MICRO)
3-12	Magnetic Starters; 15p; Cat. No. 14B1 (Furnas)	3-32	Heavy Duty Limit Switches; 19p; Cat. No. 84a (MICRO)
3-13	Electric Drum Switches; 34p; Cat. No. 58- B1 (Furnas)	3-33	Handbook and Easy Guide to Designing Control Centers (Monitor)
3-14	Distribution Switchboards; 32p; Cat. No. GEA-6627 (GE)	3-34	Snap-Lock Limit Switch; 15p; Cat. No. EC- SL 260 (National Acme)
3-15	Buy Log of Low Voltage Distribution	3-35	Pole Top Switches; 11p (Powerdyne)
	Equipment; 91p; Cat. No. GEC-1100C (GE)	3-36	Street Lighting Controls; 38p (Ripley)
3-16	Relays; 15p; Cat. No. 17-C (H-B Instru- ment)	3-27	Control Vaives; 19p; Cat. No. 5-9-60 (Ross)
3-17	Distribution Equipment; 36 p; Cat. No. 35M-5-60 (I-T-E)	3-38	Secondary Capacitors; 15p; Cat. No. i132 (Sangamo)
3-18	Panelboards, Switchboards, and Unit Sub- stations; 52p; Cat. No. 108 (Kinney)	3-39	Electrical Metallic Tubing; 11p; Cat. No. RCP-9002 (Rome)
3-19	Electrical Switches; 31 p; Cat. No. 110 (Licon)	3-40	Solid State Servo Amplifiers; 12p; Cat. No. S 1169 (Siegler)
3-20	Electrical Control Cabinets and Instrument Panels; 12p (Littleford)	3-41	Substations & Power Centers; 12p; Cat. No. 960 (Sorgel)
3-21	Distribution Equipment; 170p (Metropoli- tan)	3-42	Saturable Reactors; 4p; Cat. No. 615 (Sorgel)
3-22	Toggle Switches and Toggle Switch Assem- blies; 31p; Cat. No. 73f (MICRO)	3-43	Low Voltage Switching Systems; 16p (Touch-Plate)
3-23	Precision Switches; 28p; Cat. No. 101e (MICRO)	3-44	Selenium Rectifiers; 47p; Cat. No. 3116-1a (Vickers)
3-24	Basic Switches for Airborne Equipment; 31p; Cat. No. 78a (MICRO)	3-45	Magnetic Amplifiers; 32p; Cat. No. 1105-1 (Vickers)
3-25	Enclosed Switches for Airborne Equipment; 15p; Cat. No. 77c (MICRO)	3-46	Distribution Equipment: 423p; Cat. No. 60 (Wadsworth)
3-26	Lighted Display and Pushbutton Switch Devices; 19p; Cat. No. 67a (MICRO)	3-47	Pushbutton Switches & Signal Lights; 72p; Cat. Sec. 1 (Rees)
3-27	Small Basic Switches; 19p; Cat. No. 63a (MICRO)	3-48	Control Units: 20p; Cat. Sec. 2 (Rees)
3-28	Trip Control; 15p; Cat. No. 65c (MICRO)	3-49	Cylindrical Pushbutton Switches; 8p; Cat.
3-29		• -17	Sec. 3 (Rees)
3-29	Basic Switches for Industrial and Com- mercial Applications; 32p; Cat. No. 62c (MACPO)	3-50	Limit Switches and Foot Switches; 44p;

#### SECTION 4. PROTECTIVE DEVICES

3-10 Retary Multipole Switches; 17p; Cat. No. 101-A (Electro Switch)

#### 4A. FUSE CUTOUTS & LINKS

#### For high-voltage distribution lines.

Chance (A B) Co 210 North Allen St Centralla Mo G & W Electric Specialty Co 3500 W 127 St Blue Island III General Electric Co Apparatus Sales Schenectady Hubbard & Co 6301 Butler St Pittsburgh 1 Pa Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III Yearney (James R) Corp 4236 Clayton Ave St Louis
10 Mo
Line Material Industries McGraw-Edison Co 700 W
Michigan St Milwaukee Wis
5 & C Electric Co 4435 Ravenswood Ave Chicago
40 III
USCO Power Equipment Corp 829 N 36th Way Birmingham 4 Ala
Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa

#### 4B. FUSES

1. Cartridge
2. Current-limiting
3. Glass tube
4. Open link
5. Plug
6. Time-delay

Cartridge, plug and open-link fuses are for feeder and branch circuit distribution over-load protection; glass tube fuses protect individual devices or instruments; current-limiting fuses limit system short-circuit currents to safe values.

Bussmann Mfg Div McGraw-Edison Co University at Jefferson St Louis 7 Mo (1-2-3-4-5)

Cable Electric Products Inc 234 Deboil St Providence 7 RI (1-5)
Chase-Shawmut Co 274 Marriage St Nachanna Chase-Shawmut Co 374 Merrimac St Newburyport Mass (1-2-5)

Mass (1-2-5)
Commercial Enclosed Fuse Co of NJ 6812 Polk St Guttenberg NJ (1-3-5)
Dependable-Electric Mfg Co Inc 537 Johnson Ave Brooklyn 37 NY (5)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-3-5)
Economy Euse Div Federal Pacific Electric Co 2070 Maple St Des Plaines III (1-5)
Fyrel Fuse Co 117 W File St Pitteburgh 12 Pa

Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa

•FEDERAL PACIFIC ELECTRIC CO 50 Paris St Newark 5 NJ (1-5)—ADV PG 105 Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (2-5) General Electric Co Apparatus Sales Schenectady 5 NY (1-2-4)

General Electric Co Wiring Device Dept 95 Hath-away St Providence RI (5)

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Ave Bridgeport Conn (1 thru 5)—ADV PG

84-85

•GRAYBAR ELECTRIC CO INC 420 Lexington Ave Warren Pa (1)
Littlefuse Inc 1865 Miner St Des Plaines III (3)
Miller Electric Co 120 Main St Pawtucket RI (1-5) Div El-Tronics Inc 118 E First NY (1-5-6)

Monarch Electric Div El-Tronics Inc 118 E First St Jamestown NY (1-5-6) Pierce Renewable Fuses Inc Box F Leicester NY (1-5) Royal Electric Corp 95 Grand Ave Pawtucket RI

(1-5)S & C Electric Co 4435 Ravenswood Ave Chicago 40 III (2)—ADV PG 128 Solar Electric Corp 121 Central Ave Warren Pa (1)
Star-A Electric Mfg Co Inc 269 Meserole St
Brooklyn 6 NY (1-5)
Trico Fuse Mfg Co 2948 N 5th St Milwaukee 12
Wis (1)
Ware Fuse A Wis (1)
Ware Fuse Corp · 4400 W Lake St Chicago 24 III
(1-5) Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (2)

3-50 Limit Switches and Foot Switches; 44p; Cat. Sec. 4 (Rees)

3-30 Mercury Switches; 11p; Cat. No. 906 (MICRO)

#### 4C. FUSE ACCESSORIES

Dummy plugs
 Fuse clip clampe
 Fuse clip reducers
 Fuse cutouts, blocks & holders
 Fuse links
 Fuse wire strip
 Fuse clip reducer
 Fuse links
 Fuse clip cleaner

# Supplementary equipment for low-voltage distribution fuses.

Atlee Corp. 47 Prospect St. Woburn. Mass (2)
Bussman Mfg Div. McGraw-Edison Co. University at
Jefferson St. Louis 7 Mo (1 thru 7)
Cable Electric Products Inc. 234 Daboll St. Providence 7 RI (5)
Chase-Shawmut Co. 374 Merrimac St. Newburyport
Mass (2-5-6-7)
(5)
Circle F Mfg Co. 720 Mommouth St. Trenton 4 NJ
(5) Commercial Enclosed Fuse Co of NJ 6812 Polk St Guttenberg NJ (2-3-4-6-7) Connecticut Electric Mfg Co Main St Bantam Conn (5)

Dante Electric Mfg Co Bantam Conn (2)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza
South Long Island City 1 NY (3-4-6)
Excel Fuse Co 117 W Erie St Pittsburgh 12 Pa
(2-6) (2-6)
General Electric Co Apparatus Sales Schenectady
5 NY (5-6)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (5)
Minn (5) Industries Inc 442 Elm St Sycamore III (3-4)lisco (2) Corp 4730 Madison Rd Cincinnati 27 Ohio (2)
Interlectric Div El-Tronics Inc 1401 Lexington Ave Warren Pa (3-6)
Knox Porcelain Corp 2706 Mynders Ave (P 0 Box 2031) Knoxwille 1 Tenn (5)
Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (2-4-5)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (2)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (3-9) One Co-91
Monarch Electric Div El-Tronics Inc 118 E First
St Jamestown NY (2-6)
Multi Electric Mfg Inc 4223 W Lake St Chicago
24 Ill (2-5) ce Renewable Fuses Inc Box F Leicester NY Pier (6) Royal (4) Electric Corp 95 Grand Ave Pawtucket RI Specialties Inc 2936 Sacramento St Pittsburgh 4
Pa (2)
Square D Co Executive Plaza Park Ridge III (2)
Star-A Electric Mfg Co Inc 269 Meserole St
Brooklyn 6 NY (6)
Sylvania Electric Products Inc 730 Third Ave New
York 19 NY (2)
Trico Fuse Mfg Co 2948 No 5th St Milwaukee 12
Wis (3-4) Ware Fuse Corp 4400 W Lake St Chicago 24 III

#### 4D. CIRCUIT BREAKERS

High voltage
 600v and less
 Explosion-pro
 Vapor-proof

For primary and secondary distribution feeder and branch circuit protection.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (2) Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2) Appleton Electric Co 1701-59 Wellington Ave Chi-cago 13 III (2) Crouse-Hinds Co Syracuse 1 NY (2)

cross-Hinds Co Syracuse 1 NY (2)
CUTLER-HAMMER INC 228 N 12th St Milwaukee 1 Wis (2)—ADV PG 80-81
Derrick Light & Equipment Co 1201 E Daggett
(P 0 Box 414) Fort Worth Tex (2-4)
FEDERAL PACIFIC ELECTRIC CO 50 Paris St
Newark 5 NJ (1-2)—ADV PG 105
Gemco Electric Co 256-85 W Eight Mile Rd Detroit
40 Mich (3)
General Electric Co 46-85 W Eight Mile Rd al Electric Co Apparatus Sales Schenectady NY (1-2-3)

5 NY (1-2-3)
General Electric Co Circuit Protective Devices Dept
41 Woodford Ave Plainville Conn (2)
●GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1-2-3-4)—ADV PG 84-85 Heinemann Electric Co Pennsylvania Ave & Plum St Trenton 2 NJ (2) Hope Electrical Products Co Inc 27 Long Ave Hill-side NJ (2)

Hope Electrical Products Co Inc 27 Long Ave Hillside NJ (2)
1-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (4)
1-T-E Circuit Breaker Co BullDog Electric Products
Div 7610 Jos Campau Detroit Mich (2)
Killark Electric Mfg Co 3940 Easton Ave St
Louis 13 Mo 3-4)
Kolton Electric Mfg Co 123 New Jersey Railroad
Ave Newark 5 NJ (2)
Lake Shore Electric Corp 205 Willis St Bedford Ohio (2)
Line Material Industries McGraw-Edison Co 700

ford Ohio (2)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1)
Mechanical Products Inc 1824 River St Jackson
Mich (2)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16
NY (2)

Nelson Electric Mfg Co P O Box 5385 Tulsa Okia (1-2-3) Pyle-National Co 1344 N Kostner Ave Chicago 51 III (2-3) Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2-3) Sangamo Electric Co 11th & Converse Springfield
III (2)

Square D Co Executive Plaza Park Ridge III (1-2-3) (1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

(1.2-3)

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#### 4E. SPECIAL PROTECTIVE EQUIPMENT

Cathodic protective equipment
 Current-limiting reactors
 Lightning protective equipment
 Motor thermal overload devices
 Network protectors
 Ground rods
 Ballast thermal protectors

8. Motor single-phasing protection
9. Capacitor protective gaps
10. Fluorescent lamp circuit-breaker

protectors 11. Surge protectors

Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-4) Holdstein (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (6) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (2) Brach Mfg Corp 200 Central Ave Newark 3 NJ Cathodic Protection Service 4601 Stanford St Houston Tex (1) Copperweld Steel Co Wire and Cable Div Glassport Pa (3-6) (3) Cutler-Hammer Inc 228 N 12th St Milwaukee 1 Wis (4) Cutler-Hammer Inc 220 M 2211 C WIS (4) Delta-Star Electric Dlv H K Porter Co Inc 2437 Fulton St Chicago 12 III (3) Djeco Div Djordjevic Engineering Co 1933 N Damen Ave Chicago 47 III (1-2) Engelhard Industries Inc Industrial Equipment Div Instruments & Systems Sec 850 Passaic Ave East Newark NJ (1) General Cable Corp 730 Third Ave New York 17 NV (1)

General Electric Co Apparatus Sales Schenectady 5 NY (1 thru 5-9) Goetz (J F) Mfg Co 162 South St Hartford Wis

Good-All Electric Mfg Co 112 W First St Ogaliala Neb (1) Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (3-6) (3-6) Independent Protection Co Inc 1605-07 S Main St Goshen Ind (3) Joslyn Mfg & Supply Co 3700 S Morgan St Chi-cago 9 III (3) cago 9 III (3)
Kearney (James R) Corp 4236 Clayton Ave St Louis
10 Mo (3)
Knopp Inc 1307 66th St Oakland 8 Calif (1)
Knopp Inc 1307 66th St Oakland 8 Calif (1)
Knotick Mfg Co 5600 Third St San Francisco
24 Calif (6)
Line Material Industries McGraw-Edison Co 700 W
Michigan St Milwaukee Wis (3)
M & W Electric Mfg Co Inc S Walnut St (P 0
Box 87) East Palestine Ohio (6)
Mechanical Industries Production Co 217-223 Ash
St Akron 8 Ohio (4)
Metals & Controls Inc 34 Forest St Attleboro St Akron 8 Ohio (4)
Metals & Controls Inc 34 Forest St Attleboro
Mass (4-7)
Murray Mfg Corp 1250 Atlantic Ave Brooklyn
16 NY (2)
Nelson Electric Mfg Co P O Box 5385 Tulsa Okla
(1)
New Jersey Zinc Co 360 Front St New York 38 NY (1-6)
New Jersey Zinc Co 160 Front St New York 38
NY (1-6)
NY ( (6) Porcelain Products Co 224 N Patterson St Carey Ohio (6)
Premax Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY (6)
R T & E Corp 1900 E North St Waukesha Wis (3)
Railroad Accessories Corp Tenakill Park Cress-kill NJ (3)
Rome Cable Div of Alcoa 421 Ridge St Rome
NY (1) NY (1)
Security Mfg & Contracting Co 606-612 Pine St
Burlington Wis (3)
Stradley Engineering Co P O Box 6006 Pittsburgh
11 Pa (8)
Swedish Iron & Steel Corp 910 Westfield Ave
Elizabeth NJ (10)
Vickers Inc Electric Products Div 1847 Locust
St St Louis 3 Mo (11)
Wallace & Tiernan Inc 25 Main St Belleville
NJ (1)
Weaver (J A) Co 2110 Howard St St Louis 6 Ma

Weaver (J A) Co 2110 Howard St St Louis 6 Mo

(6)
Wastinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (2-3-4-5-8-9)

WESTINCHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (2-6)

—ADV PG 2nd cover

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

\*Code No. Description, Pages Catalog No. & Mfr.

4-1 Fuses; 84p (Chase-Shawmut)

4-2 Fuses; 20p; Cat. No. 14 (Littelfuse)

4-3 Lightning Protection; 12p (Security)

#### SECTION 5. WIRING DEVICES AND BOXES

See index for panelboards and other equipment normally housed in cabinets.

Switches other than wiring device switches are listed in Sec. 3.

Hangers and supports for cable and conduit are listed in Sec. 6 & 7, respectively.

Lamp dimmers are listed in Sec. 3.

#### **5A. WIRING DEVICE SWITCHES**

- Canopy
   Celling pull
   Cord
   Delayed action
   Door-operated
   Key-operated
   Lever-operated pull

- 8. Lumiline cap
  9. Mercury
  10. Momentary contact
  11. Oil burner
  12. Pendant
  13. Pushbutton
  14. Rotary
  15. Tumbler
  16. Weatherproof
  17. Toggle
  18. Tap
  19. Rocker type
  20. Silent type

Small switches used for general control of lighting and appliance loads in residences, offices, etc.

Alcor Mfg Co 1140 S Seventh St De Kalb III (1-5-10-13-14)

Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1-2-3-5-8-9-10-12-13-14-15-16)

91
Controls Co of America Control Switch Div 1420
Delmar Dr Folcroft Pa (13-17)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-5-6-7-10-11-12-13-14-16)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza
South Long Island City 1 NY (1-2-5-12-15-16-271)

Edwards Co Inc Norwalk Conn (13) Furnas Electric Co 1067 McKee St Batavia III (13)

78-79
Kulka Electric Corp 633 S Fulton Ave Mount
Vernon NY (1-3-10)
Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn
22 NY (1-2-3-8-9-10 thru 16-18)
Massey (A H) Inc 111 3rd St (P 0 Box 206)
Derby Conn (15)

Royal Electric Corp 95 Grand Ave Pawtucket RI (1-16) Russell & Stoll Co Inc 125 Barclay St NY 7 NY (15-16)

Theiler (H J) Corp Ashmont Ave Whitinsville Mass (15) Touch-1 Plate Mfg Corp Box 1970 Long Beach Calif Trine Mfg Corp 1430 Ferris Place New York 61 NY (5)

Amprobe Instrument Corp 630 Merrick Rd Lynbrook NY (10)
Arrow-Hart & Hegeman Electric Co 103 Hawthorne St Hartford 6 Conn (1-2-3-6-10-12-13-14-15-16)

Cable Electric Products Inc 234 Daboil St Providence 7 RI (3-12-14-15-17)

CIRCLE F MFG CO 720 Mommouth St Trenton 4
NJ (1-2-3-5-8-10-11-12-13-14-15-16)—ADV PG

201 Edco International Corp 20722 W Seven Mile Rd Detroit 19 Mich (4)

Gem Electric Mfg Co Inc 237 37th St Brooklyn NY (16)

General Electric Co Wiring Device Dept 95 Hath-away St Providence RI (1-3-5-8-9-11-13-14-15-16)

May 31 Froutence Rt 12-72-30-711-13-14-13-16-13-

Derby Conn (15) Gill Mfg Co Inc Valparaiso Ind (1-7-10-13-17-19) 19)
MICRO SWITCH Div of Minneapolis-Honeywell Regulator Co Chicago & Spring Freeport III (12)
Minneapolis-Honeywell Regulator Co 2753 Fourth
Ave S Minneapolis & Minn (11-13)
Pass & Seymour Inc Syracuse 9 NY (2-3-5-6-9-10-Ave 3

Pass & Seymour Inc Syracuse 9

12-13-15-16)

Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa

(9-13-15)

Flactric Corp 95 Grand Ave Pawtucket RI

(15-16)
SIERRA ELECTRIC CORP 15100 S Figueroa St. (P 0 Box 65) Gardena Calif (6-9-13-15-17-20)—ADV PG 111
Slate Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove Ny (2-5-6-9-10-11-13-15-16)
Suttle Equipment Co 135 S LaSalle St. Chicago 3 III (13)
Theiler (H 1) Corp. Ashmort Ann Militimello. NY (5)
Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (5-16)
Winterburn Mfg Co P O Box 386 Putnam Conn (5)

5B. CORD CONNECTION DEVICES

1. Caps, plugs, bases & taps, household type
2. Convenience outlets
3. Multi-outlet assemblies
4. Power cord-connection bodies, heavy duty
5. Range & dryer receptacles
6. Weatherproof outlets
7. Grounding adapters
8. TV antenna outlets
9. Combination TV-ac outlets
10. Fused plugs & taps
11. Explosion-proof plugs & receptacles
12. Locking-type plugs & receptacles
12. Locking-type plugs & receptacles

Devices for extension of electrical circuits to equipment by means of portable cords.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (2)

Aitken-Reed Inc 2802 Wollmer St Manitowac Wis (3)

Wis (3)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (6)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (1 thru 7)
B & M Electric Corp 168 7th St Brooklyn 15
NY (10)

NY (10)

Bekley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (1-4)

BELL ELECTRIC CO 5735 S Claremont Ave Chicago 36 III (2-4-5-6)—ADV PG 130-131

Black (M) Mfg Co 300-08-N Third St Phila 6 Pa

Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Conn (1-2-3-4-5-6)
CBC Electronics Co Inc 2601 N Howard St Philadelphia 33 Pa (3)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1-2-3)
Cam-Lok Dly Empire Products Inc 9213 Blue Ash Rd Cincinnati 42 Ohio (4-6-11)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (4)
CIRCLE F MFG CO 720 Monmount St Transfer A

Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (4)

CIRCLE F MFG CO 720 Monmouth St Trenton 4 NJ (1 Intru 7)—ADV PG 91

Crouse-Hinds Co Syracuse 1 NY (1-2-3-4-6)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (4)
Derrick Light & Equipment Co 1201 E Daggett (P 0 Box 414) Fort Worth Tex (6)
Duro-Test Corp 2321 Hudson Bivd North Bergen NJ (1)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza NJ (1) Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (1-2-4-5-6-7) Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (3-4) Ohio (3-4)
Gem Electric Mfg Co Inc 237 37th St Brooklyn
NY (1-2-3-4-5-6)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-2-4-5-6-7)
Glade Mfg Co 1632 W 75 Pl Chicago 20 III (1)
GRAYBAR ELECTRIC CO INC. 420 Lexington Ave
NY 17 NY (1 thru 6)—ADV PG 2
Hessel (W F) Co Inc 74 Beekman St NY 38 NY
(3-4-6-10)

Hessel (3-4-

(3-4-6-10)

HOFFMAN ENGINEERING CORP 1050 Tyler St
Anoka Minn (3-6)—ADV PG 102-118

Hopax Electric Inc 547 Greenwich St NY 13 NY

●HUBBELL (HARVEY) INC State St & Bostwick Ave Bridgeport 2 Conn (1 thru 6-12)—ADV PG 125
I-T-E Circuit Breaker Co Bull Dog Electric Products
Div 7610 Jos Campau Detroit Mich (3)
Industrial Automation Corp 2415 W Montrose Ave
Chicago III (6)
Jordan Industries Inc 3030 N W 75 St Miami
47 Fla (1)

Jordan Îndustries Inc 3030 N W 75 St Miami 47 Fia (1)

Joy Mfg Co Electrical Products Div 1201 Macklin Ave St Louis 10 Mo (3-4-6)

KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (6)—ADV PG 78-79

Kondu Corp 1040 W 12 St Erie Pa (4)

Knox Porcelain Corp 2706 Mynders Ave (P 0 Box 2031) Knoxville 1 Tenn (1-2-4-5-6)

Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1-2)

Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1-2-4-5-6)

Massey (A H) Inc 111 3rd St (P 0 Box 206) Assey (A H) Inc 111 3rd St (P 0 Box 206)
Derby Conn (1-2-3-4)
McKinley (Ben P) Co 522 S Clinton St Chicago 7
III (2-4-5) Till (24-45)

Nidwest Electric Products Inc 1515 N Front St Mankato Minn (1.74-6)

Murray (D A) Co Inc 632 N Mill St Tipton Ind (1)

PLM Products Inc 3871 W 150 St Cleveland 11 Ohio (4)

Pass & Seymour Inc Syracuse 9 NY (1.2-4-5-6)

Perfect-Line Mfg Corp Old Country Rd & Railroad Ave P 0 Box 65 Hicksville LI NY (6)

Ple-National Co 1344 N Kostner Ave Chicago 51 Ill (3-4-6)

Bab Electric Mfg Corp Code Country Rd & Railroad Ave P 0 Box 65 Hicksville LI NY (6)

Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (6)
Ralco Mfg Co 123-141 N Albany Ave Chicago 12 III (4-13) odale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1-2-3-4-5-7) Royal Electric Corp 95 Grand Ave Pawtucket RI (1 thru 7) SIERRA ELECTRIC CORP 15100 S Figueroa St (P 0 Box 85) Gardena Calif (2-3-5-6)—ADV PG 111

Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (2-4-5-6) Sta-Tite Mfg Co 2000 Wyandotte Kansas City 8 Mo (1) Standard Electric Time Co 89 Logan St Springfield 2 Mass (3)

Star-A Electric Mfg Co Inc 269 Messerole St Brooklyn 6 NY (1-2-4-5-6) Stemco Mfg Co Box 9024 Stockyards Sta Den-wer 16 Colo (8)

Electric Products Co 333 Monroe Ave worth NJ (2-4-6) Superior Electric Co 83 Laurel St Bristol Conn (4) Tigerman Engineering Co 4332 N Western Ave Chi-cago 18 III (6) Urell Inc Bradford Pa (1)

Wilkoff (M J) Co 823 Locust Pittsburgh 19 Pa ●WIREMOLD CO Hartford 10 Conn (3)—ADV PG 4 Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 III (1-3-4-12)

#### SC. LAMP ACCESSORIES

1. Ballasts
2. Bayonet sockets
3. Bipost sockets
4. DC fluorescent resistors
5. Fluorescent lamp capacitors
6. Fluorescent lamp holders
7. Fluorescent thermal starters & sockets
8. Locks & guards
9. Lumiline lamp holders
10. Screw sockets
11. Socket adapters & reducers
12. Quartz lamp holders
13. Weatherproof sockets

Adjustable Fixture Co 104 E Mason St Milwaukee 2 Wis (10)
Advance Transformer Co 2950 N Western Ave Chicago 18 111 (1)
Chicago 18 111 (1)
Apollo Lighting Fixture Co Inc 162 W Third St Mit Vernon NV (2)
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St Hartford 6 Conn (6-7-8-9-10-11)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 ky (3-10-11)
Bryant Electric Co 1041 (1921 State St (Box D Barnum Sta) Bridgeport 2 Conn (3-6-7-8-10-11)
Cable Electric Products Inc 234 Daboli St Providence 7 RI (6-7)
Chadsey Corp P O Box 1858 Hartford 1 Conn (8)
CIRCLE F MFG CO 720 Monmouth St Trenton 4 NJ (3-6-7-10-11)—ADV PG 91
Coll Co of America Inc 207-209 Washington St Northwale NJ (1)
Crouse-Hinds Co Syracuse 1 NY (10)
Day-Ray Products Inc 1133 Mission St South Pasadena Calif (1-6)
Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (10)
Dallight Corp 60 Stewart Ave Brooklyn 37 NY (2-10)
Dolco Mfg Co 2350 Curray St Long Beach 5

C2-107
Dolco Mfg Co
Calif (13)
Prake Mfg Co
Chicago 31 III (2-10) Dura Electric Lamp Co Inc 62 E Bigelow St New-ark 8 NJ (7)

Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1-6-7-11) Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NV (2-6-8-10-11-13)

13)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (7)
Electric Cord Co 432 Plane St Newark 2 NJ (8)
Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (8-10) France Mfg Co 10325 Berea Rd Cleveland 2 Ohio (1) (1)
Gem Electric Mfg Co Inc 237 37th St Brooklyn
NY (10-11)
General Electric Co Apparatus Sales Schenectady
5 NY (1-5)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (6-7-9-10-11)
GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1 thru 13)—ADV PG
84-85

Ave 84-85

Gets-A-Lite Co 3865 N Milwaukee Ave Chicago 41 III (8) rard-Hopkins 1000 40th Ave Oakland 1 Calif Gir

(5)
HNBBELL (HARVEY) INC State St & Bostwick Ave
Bridgeport 2 Conn (6-7-10-11)—ADV PG 125
Jackson Electrical Co 900 W Van Buren St Chicago
7 III (10)
Jefferson Electric Co 25th & Madison Bellwood III (1)

(1)
Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (10)
Kulka Electric Corp 633 S Fulton Ave Mount Vernon NY (1.2-6-7-10-11)
Laduby Co Inc Boston Post Rd (P O Box 88)
Branford Conn (8)
Lectrohm Inc 5560 Northwest Highway Chicago 30
Ill (4) Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (6-7-9-10-11) Marco Industries 207 S Helena St Anaheim Calif

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(10)
Marvel Lamp Co 307 Newark St Hoboken NJ (7)
Marvel Lamp Co 307 Newark St Hoboken NJ (7)
Massey (A H) Inc 111 3rd St (P O Box 206)
Derby Conn (10)
McGill Mfg Co Inc Valparaiso Ind (8)
Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio (12)
Morse (Frank W) Co 354 Congress St Boston 10
Mass (2-11)
New York Fluorescent Mfg Co Inc 162 Bowery
New York 12 NY (7)
Pass & Seymour Inc Syracuse 9 NY (6-7-10-11)
Pattern Products Co Inc P O Box 135 Union NJ (8)
Pyle-National Co 1344 N Kostner Ave Chicago 51
III (10)
Radionic Transformer Co 411 S Sangamon St Chi-

III (10)
Radionic Transformer Co 411 S Sangamon St Chicago 7 III (1)
Raico Mfg Co 123-141 N Albany Ave Chicago 12 III (10)

Rite-O-Lite Co 308 E Washington Blvd Los Angeles Calif (B)
Robertson Transformer Ca Thornton Road Blue Island III (1) odale Mfg Co Inc 6th & Minor Sts Emmaus Pa (10-11) Rod Royal Electric Corp 95 Grand Ave Pawtucket RI (10-13) RI (10-13) Slater Electric & Mfg Co Inc 45 Sea Cliff Ave Glen Cove NY (10) Solan Electric Div Basic Products Corp 1719 Busse Rd Elik Grove 11 (1) Sola Electric Div Basic Products Corp 1717 Ova-Rd Elik Grove III (1)
Star-A Electric Mfg Co Inc 269 Meserole St Brook-lyn 6 NY (6-7-10-11)
Stratfield Co 434 Grand St Bridgeport 4 Conn (1)
Suclar Laboratories Inc 1197 McCarter Highway Newark NJ (7)
Surelite Products Co 368 E 148 St New York 55 NY (7)
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (1-6)
Sylvania Electric Products Inc 730 Third Ave New York 19 NY (7)
Union Insulating Co Inc Box 351 Parkersburg W Va (10) niversal Mfg Corp 29-51 E 6th St Paterson NJ Ward Leonard Electric Co 28 South St Mount Vernon NY (4) Vernon NY (4)
Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (10)
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1) Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 III (8-10)

#### 5D. BOXES, WIRING

Concrete, sidewalk & underground Explosion-proof

3. Floor
4. Interior wall & coiling
5. Non-metallic
6. Pole base
7. Submersible
8. Weatherproof
9. Vaporproof

Boxes for installation of wiring devices, for splices and connectors, and for pulling con-ductors into raceways. For boxes enclosing equipment, see "Cabinets" in index.

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (1-2-6-8)
Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (3-4)
Albambra Foundry Co Ltd 1147 Meridian Ave Albambra Calif (2)
ALL-STEEL EQUIPMENT INC Aurora III (4)
ADV PG 117
Allied Metal Stamping Co 1475 S 6th St Camden 4 NJ (1-4-5)
Almetal Engineering Inc 1003 S Date Ave Albambra Calif (4)
Alwalt Mfg Co Inc 1706 Lapham Dr (P 0 Box

Alimetal Engineering Inc 1003 S Date Ave Alhambra Calif (4)
Alwalt Mfg Co Inc 1706 Lapham Dr (P 0 Box 1171) Modesto Calif (1.3-7-8)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (1.2-4-8)

ARROULET CORP Foot of Bower St. Montgomery Pa (4-8)—ADV PG 127
ARROULET CONDUIT & FITTINGS CORP 108-20
180th St Jamaica 33 NY (1.4)—ADV PG 126
8 & C Metal Stamping Co P 0 Box 2506 Atlanta Ga (3-4)
Barber Electric Mfg Co Inc 30 Chestnut St N

B & C Metal Stamping Co P 0 8 ox 2506 Atlanta Ga (3-4)

Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass (8)

BELL ELECTRIC CO 5735 5 Claremont Ave Chicago 36 III (8)—ADV PG 130-131

Bonnell Electric Mfg Co Inc 192-194 Chambers St New York 7 NY (2-3-7-8)

Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (4)

Buckles (Chris) Inc 4830 S Hoyne Ave Chicago 9 III (4)

Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-2-3-4-7-8)

Calvert Co 19851 Ingersoil Dr Rocky River 16 Ohio (4)

Columbia Metal Box Co 260 E 143 St NY 51 NY (4-8)

(4-8)
Crouse-Hinds Co Syracuse 1 NY (1 thru 8)
Derrick Light & Equipment Co 1201 E Daggett
(P 0 Box 414) Fort Worth Tex (7-8-9)
Electrical Fittings Corp 37-50 57th St Woodside
77 NY (4) 77 NY (4)
Eliza Metal Products Co Box 408 Bridgeville Pa (4)

(4)

FULLMAN MFG CO 1209-1215 Jefferson St Latrobe Pa (3-6)—ADV PG 120-126
G & W Electric Specialty Co 3500 W 127 St Blue Island III (2-2-7)
Gemoe Electric Co 25685 W Eight Mile Rd Detroit 40 Mich (2-4-7-8)
General Metals Inc 858 Goldsbro Greensboro NC (8)

Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif (1-2-6-7-8)

GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (4-8)—ADV PG 2

HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (6-8)—ADV PG 102-118

HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hiliside NJ (1-2-6-7-8)—ADV PG 109

HUENEFELD CO ENGINEERING PRODUCTS DIV 2701 Spring Grove Ave Cinninnati 25 Ohio (8)—ADV PG 113

Kees (F D) Mig Co 700 Park Ave Beatrice Neb (8)

Kees (F D) Mfg Co 700 Park Ave Beatrice Neb (8)

KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (4-8)—ADV PG 123

CILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (1-2-8)—ADV PG 78-79

Lew Electric Fittings Co 627 W Lake St Chicago 6 III (3)

Meco Metal Box & Panel Mfg Co Inc 2522 W Huntingdon St Phila 32 Pa (2-8)

Midwest Electric Products Inc 1515 N Front St Mankato Minn (4-8)

MATIONAL ELECTRIC DIV H K PORTER INC Porter Bldg Pittsburgh 19 Pa (1-3)—ADV PG 97-98

Nelson Electric Mfg Co P O Box 5385 Tulsa Okla

Electric Mfg Co P O Box 5385 Tulsa Okla (2-8)

Newart Mfg Co 6725 Machinery Ave Cleveland Ohio (4)

O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn I 7 N Y (2-7-8)—ADV PG 107
Palmer Electric & Mfg Co 24 Water St Wakefield Mass (7)
Parker Electrical MFG Co 24 Water St Mass (7)

Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (4-8)

Perfect-Line Mfg Corp Old Country Rd & Railroad
Ave P O Box 65 Hicksville Ll WY (1-4-8)

Pyle-National Co 1344 N Kostner Ave Chicago 51

III (2-9) III (2-8)
Queen Products Co Inc Thirteenth & Rowan Sts
Louisville 3 Ky (4-8)
Rab Electric Mpt Co Inc 605 E 132 St New York
54 RY (1-2-8)
Raco Mfg Co 123-141 N Albany Ave Chicago 12
III (2) Richards (J R) Co P O Box 482 Carnegie Pa (1-3-4-5) Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (1-2-3-4-7-8) Russell & Stoll Co Inc 125 Barclay St NY 7 NY (2-4-8)

SPRING CITY ELECTRICAL MFG CO Spring City
35 Pa (1-2-3-4-6-7-8)—ADV PG 114-116
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1-3-4)
Stonco Electric Products Co 333 Monroe Ave
Kenilworth NJ (4-7-8)
Sun Electric Products Inc 28 S Day St Orange
NJ (4)
Thepitt Mfg Co Green & Nampood Str. Caronic Thenitt Mfg Co Gregg & Hammond Sts Carnegie Pa (4) Pa (4)
nion Insulating Co Inc Box 351 Parkersburg
W Va (4-5) Union Fittings Co P O Box 1253 Merchantville NJ

(4) Williams (H E) Products Co 106 S Main St Carthage Mo (4) Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 III (8) Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-3-8)

#### SE. BOX HARDWARE

Covers & Piates
 Hickeys
 Knackout blanks
 Studis
 Supports & hangers
 Cable-to-box connectors
 Weatherproof box covers & plates
 Floor outlet nozzles
 Explosion-proof unions
 Laph holders & spreaders
 Reducing washers

Accessories used with wiring boxes. See also "Fixture Hangers" and "Conduit Fittings" in index.

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (6) Ohio (6)

ALL-STEEL EQUIPMENT INC Aurora III (1-5)
ADV PG 117

Allen-Stevens Conduit Fittings Corp 33-53 62nd St
Woodside 77 NY (6)

Allied Industries Inc P 0 Box 119 Ogaliala Neb
(6) (6)
Allied Metal Stamping Co 1475 S 6th St Camden 4 NJ (1)
All Mall Engineering Inc 1003 S Date Ave Alhambra Calif (1-3)
Anderson Electric Corp P 0 Drawer 2151 Birmingham 1 Ala (6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (1-2-3-5-6) Arrolet Corp Foot of Bower St Montgomery Pa (1-3-5)

Arrolet Corp Foot of Bower St Montgomery Pa (1-3-5)

ARROW CONDUIT & FITTINGS CORP 108-20 180th St. Jamaica 33 NY (1-5)—ADV PG 128
Arrow-Hart & Hegeman Electric Co 103 Hawthorn St. Hartford 6 Conn (1)
Badger Die Casting Corp 201 W Oklahoma Ave Milwaukee 7 Wis (6)
BELL ELECTRIC CO 5735 S Claremont Ave Chicago 36 III (1-7)—ADV PG 130-131
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
BLACKHAMK INDUSTRES 250 S Main St Dubuque Iowa (3-5)—ADV PG 88
Bowers Mfg Co Inc 6700 Avalon Blvd Los Angeles 3 Calif (1 thru 5)
Bridgeport Fittings Inc 209 Center St Bridgeport 2. Conn (2-4-6)
Bryant Electric Co 1421 State St (Box D Barnum Sta) Bridgeport 2 Comn (1)
Buchanan Electrical Products Corp 434 U S Route 22 Hillside NJ (3-6)
Burbank Electrical Products Corp 434 U S Route 22 Hillside NJ (3-6)
Burbank Electrical Products Corp 434 U S Route P 0 Box 7 Burbank Calif (5)
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-3-5)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (1)
Circle F Mfg Co 720 Monmouth St Trenton 4 NJ (1)
Conduit Fittings Corp 6400 W 66th St Chicago 38 III (4-6)

Circle F Mfg Co 720 Monmouth St Trenton 4 N. (1)
Conduit Fittings Corp 6400 W 66th St Chicago 38 III (4-6)
Crouse-Hinds Co Syracuse 1 NY (1-3-5)
Delta-Star Electric Div H K Porter Co Inc 2437 Fulton St Chicago 12 III (6)
Dolco Mfg Co 2350 Curry St Long Beach 5 Calif (7-10)
Dossert Mfg Corp 249-255 Huron St Brooklyn 22 NY (6)
Duro Fittings Co 2210 S Davie Ave Los Angeles 22 Calif (4-6)
Eagle Electric Mfg Cor 10 Inc 23-10 Bridge Plaza South Long Island City NY (1)
Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (1)
Elliott Electric Mfg Corp 50-30 98th St Corona 68 NY (1-2-3-4-5-5)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe Pa (1-5)
Gedney Electric Co Americas Bldg Radio City NY Pa (1-5)
Gedney Electric Co Americas Bidg Radio City NY
20 NY (2-4-6)
General Electric Co Wiring Device Dept 95 Hath-away St Providence RI (1)
General Metals Inc 858 Goldsbro Greensboro NC
(1-3-4-5) General (1-3-5)

Con (5)

Heyman Mig Co Kenilworth 20 NJ (6)

HUBBELL (HARVEY) INC State St & Bostwick Are Bridgeport 2 Cenn (1)—ADV PG 113

HOW PG 113

Heal Did For Control of Contr

ADV PG 113
Ideal Industries Inc 5136 Park Ave Sycamore
III (5)
Jordan Industries Inc 3030 N W 75 St Miami
47 Fla (1-9)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb

(5)

KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (1-5)—ADV PG 123

KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (6)—ADV PG 78-79

Knox Porcelain Corp 2706 Mynders Ave (P O Box 2031) Knoxville 1 Tenn (1)

Kruse-Rieke Auburn Ind (5)

Leviton Mfg Co Inc 236 Greenpoint Ave Brooklyn 22 NY (1)

Lew Electric F 6 III (1-3) Fittings Co 627 W Lake St Chicago

Lint (Clyde W) 2323 W 18 St Chicago 8 III (3-5) M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (6) Madison Equipment Co 5405 Detroit Ave Cleve-land 2 Ohio (1 thru 5)

Massey (A H) Inc 111 3rd St (P O Box 206) Derby Conn (1) McKinley (Ben P) Co 522 S Clinton St Chicago 7 III (1-5)

Metalectrics Inc 627 Greenwich St New York 14 NY (2-4-6) Metro Casting Co Inc 47 Grattan St Brooklyn 37 NY (6) Midwest Electric Mfg Co 1639 Walnut St Chicago 12 III (2-3-4-6) Newart Mfg Co 6725 Machinery Ave Cleveland Ohio (5)

O Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (6)—ADV PG 107 PAINE CO 6 Westgate Rd Addison III (5)—ADV PG 94

Pts & Seymour Inc. Syracuse 9 NY (1)
Perfect-Line Mfg Corp. Old Country Rd & Railroad
Ave P O Box 65 Hicksville NY (1)
Pucel Enterprises Inc. 3746 Kelley Ave. Cleveland
14 Ohio (1)
Pyle-National Co. 1344 N Kostner Ave. Chicago 51
III (6)

Queen Products Co Inc Louisville 3 Ky (1)
Rab Electric Mfg Co Inc 605 E 132 St New York
54 NY (3)
Raico Mfg Co 123-141 N Albany Ave Chicago 12
III (9)
Rattan Mfg Co 10 Wall St (P 0 Box 1745) New
Haven 7 Conn (2-4-6)
Red Seal Electric Co 10307 Detroit Ave Cleveland
2 Ohio (6)
Red Seal Electric Said Indianapolis Blyd East Chicago Redi-Bolt Inc 5334 Indianapolis Blvd East Chicago Ind (4-5) into (4-5) Reichert Float and Mfg Co 2242 Smead Ave Toledo 6 Ohio (3) Richards (J R) Co P O Box 482 Carnegie Pa (1-3-4-5) Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa

(1)
Rusgreen Mfg Co 14262 Birwood Ave Detroit 38
Mich (6)
SIERRA ELECTRIC CORP 15100 S Figueroa St
(P 0 Box 85) Gardena Calif (1-7) ADV PG 111
Slater Electric & Mfg Co Inc 45 Sea Cliff Ave
Glen Cove NY (1) Spring City Electrical Mfg Co Spring City 85 Pa

(1)

Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NV (1)

STEEL CITY ELECTRIC CO 1207 Columbus NP Pa Pittsburgh 33 Pa (1-2-3-4-5)—ADV PG 104

Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NV (1 thru 5)

Stemco Mfg Co Box 9024 Stockyards Sta Denver 16 Colo (1-5)

Stonoc Electric Products Co 333 Monroe Ave Kenll-worth NJ (1-7)

Thepitt Mfg Co Gregg & Hammond Sts Carnegie Fa (6)

Thomas & Betts Co 36 Butler St Elizabeth 1 NJ **OSTEEL** Thomas & Betts Co 36 Butler St Elizabeth 1 NJ (3-5-6)

(3-5-6) Unimatic Corp Sherwood Lane Caldwell NJ (6) Williams (H E) Products Co 106 S Main St Carthage Mo (1-5) Yorkville Metal Products Co 627 Greenwich St New York 14 NY (2-4-6)

| KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (1 thru 5)—ADV PG 123 |
| KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (3-4-5)—ADV PG 78-79 |
| Kolton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (3-4-5) |
| Leonard Electric Mfg Co 3907 Perkins Ave Cleveland 14 Ohio (3-4-5) |
| Littleford Bros Inc 453 E Pearl St Cincinnati 2 Ohio (3) |
| Meco Metal Box & Panel Mfg Co Inc 2522 W Huntingdon St Phila 32 Pa (1-3-5) |
| Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 NY (1 thru 6) |
| Midwest Electric Products Inc 1515 N Front St Mankato Minn (1-4) |
| Moldcast Mfg Co 236 South St Newark 5 NJ (6) |
| Mullembach Div Electric Machinery Mfg Co 2100 E 27 St Los Angeles 58 Calif (3) |
| Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 |
| Nelson Electric Mfg Co P 0 Box 5385 Tulsa Okla

NY (4-5) elson Electric Mfg Co P O Box 5385 Tulsa Okla (3)

Presson Electric Mfg Co P O Box 5385 Tulsa Okla
(3)

Northbrook Products Inc Industrial Div 624 S
Michigan Ave Chicago 5 III (8)

Palmer Electric & Mfg Co 24 Water St Wakefield
Mass (1 thru 5)

Parker Electrical Mfg Co 221 Washington St Oakland 7 Calif (1 thru 5)

Queen Products Co Inc Thirteenth & Rowan Sts
Louisville 3 Ky (1-2-3-4-5)

Russell & Stoll Co Inc 125 Barclay St New York
7 NY (7)

PSPRING CITY ELECTRICAL MFG CO Spring City 85

Pa (1 thru 5-7)—ADV PG 114-116

Square D Co Executive Plaza Park Ridge III
(1 thru 5)

Standard Electric Time Co 89 Logan St Springfield

(1 thru 5)
Standard Electric Time Co 89 Logan St Springfield
2 Mass (3)
Sun Electric Products Inc 28 S Day St Orange
NJ (1-3-5)
V Fitting Co P 0 Box 1253 Merchantville NJ
(1)

Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (1-3-4-5) Young Electric & Mfg Co Inc 2134 Curtis Denver 2 Colo (1-2-3-4-5)

STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa (1)—ADV P6 104 Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1) Thompson Electric Co P O Box 873 Cieveland 22 Ohio (2)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (1)
Unistrut Products Co 933 Washington Blvd Chicago 7 III (1)
Versabar Corp 14 Whyte St Jersey City NJ (1)
Wil-Son Mfg Co Cloverport Ky (1)
Wil-Son Mfg Co Cloverport Ky (1)
Wil-Son Mfg Co 15 N Jefferson St Chicago 6 III (2)
Varywille Metal Products Co 627 Greenwich St Yorkville Metal Products Co 627 Greenwich St New York 14 NY (1)

#### SH. METER SOCKETS & MOUNTINGS

Sockets, troughs and accessories for kw-hr meters. See Sec. 5F for meter cabinets.

Anchor Mfg Co P O Box 959 Manchester NH 8 & C Metal Stamping Co P O Box 2506 Atlanta Ga Code Corp 222 Kalos St Philadelphia 28 Pa General Electric Co Apparatus Sales Schenectady 5 NY General Switch Co 45 Roebling St Brooklyn 11 Kees (F D) Mfg Co 700 Park Ave Beatrice Neb Murray Mfg Corp 1250 Atlantic Ave Brooklyn 16 NY NY Palmer Electric & Mfg Co 24 Waters St Wake-field Mass Square D Co Executive Plaza Park Ridge III Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa

#### SF. CABINETS. HOUSINGS & ENCLOSURES

- Fuse & cutout Meter

- Meter
  Panelboard
  Switch & circuit breaker
  Transformer
  Weatherproof
  Explosion-proof
  Trolley wire protective enclosures

Enclosures only; used for mounting and protection of equipment.

Adam (Frank) Electric Co 3647 Windsor Pl St Louis Mo (1-3-4) Alwalt Mfg Co Inc 1706 Lapham Dr (P 0 Box 1171) Modesto Calif (1-2-3-5) Appleton Electric Co 1701-59 Wellington Ave Chi-Appleton Electric ( Atlas Metal Industries 259 W 23 St Hialeah Fla (3-5-6)
B & C Metal Stamping Co P 0 Box 2506 Atlanta Ga (6)
Barber Electric Mfg Co Inc 30 Chestnut St N Attleboro Mass (1-5)
Bonnell Electric Mfg Co Inc 192-194 Chambers St New York 7 NY (1-3-4-6-7)
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ (1-2-3-4-5)
Cleveland Switchboard Co 2925 E 79 St Cleveland Co 2925 E 7 Metal Industries 259 W 23 St Hialeah Fla code Corp 222 Kaios St. Philadelphia 28 P. Columbia Metal Box Co. 260 E 143 St. NY 51 (1-3-5) (1-3-5)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (3-5)
Crouse-Hinds Co Syracuse 1 NY (1-3-4-7)
Cutler-Hammer Inc 228 N 12th St Millwaukee 1

Crouse-Hinds Co Syracuse 1 NY (1-3-4-7)
Cutler-Hammer Inc 228 N 12th St Milwaukee 1
Wis (1-2-3-4)
Derrick Light & Equipment Co 1201 E Daggett
(P 0 Box 414) Fort Worth Tex (4-6)
Eliza Metal Products Co Box 408 Bridgeville Pa (3)
Empire Switchboard Co Inc 810 Fourth Ave Brooklyn 32 NY (3-4-6)
Falstrom Co 62 Falstrom Court Passalc NJ
(2-3-4-5) (2-3-4-3) Gemco Electric Co 25685 W Eight Mile Rd De-troit 40 Mich (3-5) General Metals Inc 858 Goldsbro Greensboro NC

(1-2)
Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif (1-2-5-6-7)
Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif (1-2-5-6-7)
GHOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn (1 thru 6)—ADV PG 102-118
HOPE ELECTRICAL PRODUCTS CO INC 27 Long Ave Hilliside NJ (1-5)—ADV PG 109
HUEMEFELD CO ENGINEERED PRODUCTS DIVIDENT Spring Grove Ave Cincinnati 25 Dhio (1-3-4-5)—ADV PG 113
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb (2-5)

#### SG. FIXTURE HANGERS & SUPPORTS

1. Fixed 2. Disconnecting type

Stems, channels, brackets and chain for permanent support of lighting fixtures. For poles and standards, see index.

Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (1)
Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 NY (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Bowers Mfg Co Inc 6700 Avalon Bivd Los Angeles 3 Calif (1)
Crouse-Minds Co Syracuse 1 NY (1) Crouse-Hinds Co Syracuse 1 NY (1)
Eagle Mfg Co 3508 Avalon Blvd Lcs Angeles 11
Calif (1) Elliott Electric Mfg Corp 50-30 98th St Corona 68 NY (1) NY (1) Federal Shock Mount Corp 1060 Washington Ave New York 56 NY (1) Gedney Electric Co Americas Bldg Radlo City NY 20 NY (1) ubbard & Co 6301 Butler St Pittsburgh 1 Pa Ideal Industries Inc 5136 Park Ave Sycamore III Jackson Electrical Co 900 W Van Buren St Chicago 7 III (1)
Kees (F D) Mfg Co 700 Park Ave Beatrice Neb

(1)
KILLARK ELECTRIC MFG CO 3940 Easton Ave
St Louis 13 Mo (1)—ADV PG 78-79
Lint C(1)de W) 2323 W 18 St Chicago 8 III (1)
Madison Equipment Co 5405 Detroit Ave Cleveland
2 Ohio (1) Metalectrics Inc 627 Greenwich St New York 14 MY (1) Mult-A-Frame Corp 6401 Epworth Blvd Detroit 10 Mich (1) Mich (1) Mult Electric Mfg Inc 4223 W Lake St Chicago 24 III (1) Myers Electric Products Inc 3019 S Vail Ave Los Angeles 22 Calif (2) PAINE CO 6 Westgate Rd Addison III (1)—ADV PG 94 PFAFF & KENDALL 84 Foundry St Newark 5 NJ (2)—ADV PG 106 POWER-STRUT DIV VAN HUFFEL PRODUCTS INC Dietz Rd Warren Ohio (1-2)—ADV PG 93 Pyle-National Co 1344 N Kostner Ave Chicago 51 III (1) Muit ame Corp 6401 Epworth Blvd Detroit 10

Quadrangle Mfg Co 32 S Peoria St Chicago 7 III Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

#### Code Description, Pages Catalog No. & Mfr.

- 5.1 Wiring Boxes; 14 p (Allied)
- 5-2 Electrical Fittings; 13p; Cat. No. 116 (At-
- Metal Wall Plates; 30p; Cat. No. 31-D (Bell)
- Weatherproof Wiring Devices; 16p (Bell)
- 5-5 Wiring Devices; 70p; Cat. No. 5A-82 (GE)
- 5-6 Pull Boxes & Gutters, 23p (Gibbons)
- 5-7 Heavy Duty Plugs and Receptacles: 50p; Cat. No. 40 (Hessel)
- Specification Grade Wiring Devices; 8p (Hubbell)
- Wireways, Fittings, Boxes, Cabinets and Enclosures; 27p; Cat. No. 160-A (Key-
- Outlet Boxes and Switch Boxes; 12p; Cat. No. 159-C (Keystone) 5-10
- 5-11 Wiring Devices; 16p Cat. No. 1101 (Leviton)
- Wiring Devices; 23p; Cat. No. W-58 (Per-fect-Line)
- Receptacles, Plugs and Connectors; 27p; Cat. No. 1252-11 (Pyle-National)

5-14

- Cabinets and Enclosures; 28p; Cat. No. C-29 (Queen Products) Electrical Boxes and Fittings; 44p; Cat. No. 15 (Spring City) 5-15
- Manual of Fluorescent Lamp Ballasts; 16p; Cat. No. M-1160 (Universal) 5-16
- Catalog of Fluorescent Lamp Ballasts; 32p; Cat. No. LPC-1160 (Universal)

#### SECTION 6. CONDUCTORS AND CONNECTORS

Wire and cable are listed in 6A, 6B and 6C by code letter designations used in the National Electrical Code; Sections 6D and 6E list applications.

Wire and cable tools are listed in 12B; underground supports, poles, etc. in Sec. 1; raceways and enclosures in Sec. 7.

#### 6A. BUILDING & POWER CABLE

- A, AA, AI, AIA—asbestos
   AC, ACT, ACV—armored cable
   ACL—armored cable, lead-covered
   AVA, AVB, AVL—asbestos & varnished
- cambric

- 7. AVA, AVB, AVL—assestos & varnished cambric
  5. MI—mineral-insulated, metal-sheathed
  6. NM, NMC—non-metallic sheathed
  7. Paper, underground service
  8. R—code rubber
  9. RH, RHH—heat-resistant rubber
  10. RH-RW, RHW—moisture & heat-resistant rubber
  11. RW—moisture-resistant rubber
  12. RU—latex rubber
  13. RUH—heat-resistant latex rubber
  14. RUW—moisture-resistant latex rubber
  15. SB—slow-burning
  16. SE, ASE, USE—service entrance
  17. T—thermoplastic
  18. TA—thermoplastic & asbestos
  19. TW—moisture-resistant thermoplastic
  cuit
  2. V—varnished combile. cuit
- cuit
  21. V—varnished cambric
  22. WP—weatherproof
  23. THW—heat-resistant thermoplastic
  24. TBS—thermoplastic & fibrous braid
  25. SA—silicone asbestos
  26. SEU—service entrance, armored
  27. Aluminum (ACSR), bare
  28. Aluminum (ACSR), covered

- Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (8-17-19)
  Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1-2-4-6-8-9-10-11-16-17-18-19-20-21)

- 21)
  American Electric Cable Co 181 Appleton St
  Holyoke Mass (19)
  American Flexible Conduit Co Inc
  Ave New Bedford Mass (2)
  American Insulated Wire Corp 36 Freeman St
  Pawtucket RI (1-24-6-8-9-10-11-17-18-19-2021-22)
  American Metal Moulding Co.
- 21-22)
  American Metal Moulding Co 146 Coit St Irvington NJ (2-3-19)

  \*\*MERICAN STEEL & WIRE DIV UNITED STATES
  STEEL CORP Rockefeller Bidg Cleveland 13
  Ohio (1-3-7-8-9-10-11-15 thru 19-21-22) ADV
  PG 72-73
- Anaconda Wire & Cable Co 25 Broadway New York 4 NY (4-6-7-8-9-10-11-16-17-18-19-20-21-22) Chester Cable Corp Oakland Ave Chester NY (2-3-6-17-20)
- Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth L1 NY (2-3-6-8-9-10-11-16-17-19-20-21-22)
- Clifton Conduit Co 3300 Eastbourne Ave Baltimore 24 Md (2)
- 24 Md (2)
  Collyer Insulated Wire Co. 249 Roosevelt Ave Pawtucket Ri (1-4-6-9-10-16-18-19-20-21-23)
  Columbia Cable & Electric Corp. 255 Chestnut St Brooklyn 8 Ny (2-3-6-17-19-20-26)
  Continental Wire Corp. P 0 Box 366 Wallingford Conn (1-4-17-18-19-20-21-23-24)
  Copperweld Steel Co. Wire and Cable Div. Glassport Pa. (22)
  Corpish Wire Co. 2
- sh Wire Co Inc 50 Church St NY 7 NY
- (17)

  ●CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (2-3-6-8-9-10-11-16-17-19-20-21)—ADV PG 95 Diamond Wire & Cable Co 445 Park Ave Sycamore III (2-3-10-11-16-17-19-20-22-23-26)

- Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (2-3-6-8-9-10-11-16-17-19-20-22-
- ●ETTCO WIRE & CABLE CORP 75 Onderdonk Ave Brooklyn 37 NY (2-6-16-17-19-20-23)—ADV PG 116
- 116
  GENERAL CABLE CORP 730 Third Ave New York
  17 NY (1 thru 11—16 thru 22)—ADV PG 82-83
  General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-2-3-4-6-9-10-11GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
  Bridgeport Conn (1 thru 4-6-9-10-11-15-16-1819-20-21-22)—ADV PG 84-85
  COPPER & STEEL INDUSTRIES INC 487 Hillside
  Ave Hillside 5 NJ (2-6-9-10-11-16-19-20)—
  ADV PG 89
- COPPER & STEEL INDUSTRIES INC 487 Hillside
  Ave Hillside 5 NJ (2-6-9-10-11-16-19-20)—
  ADV PG 89
  Kaiser Aluminum & Chemical Sales Inc Kaiser Center
  300 Lakeside Dr Oakland 12 Calif (6-8 thru 14
  16-17-19-20-22)
  Kennecott Wire & Cable Div Okonite Co Phillipsdale (Rumford 16) RI (3-7-15-21-22)
  Narragansett Wire Co 1125 Main St Pawtucket
  RI (6-9-16-19-20-22-23)

  NATIONAL ELECTRIC DIV H K PORTER CO INC
  Porter Bidg Pittsburgh 19 Pa (1-2-3-4-6-9-1016-18-19-20-21)—ADV PG 97-98
  Nelson Electric MIG Co P O Box 5385 Tulsa Okla
  (5)

- Normandy Electric Wire Corp 125 Second St Brook-lyn 31 NY (2) Okonite Co Passaic NJ (1-4-7-9-10-11-16-19-21-
- 22)
  Olin Conductors Metals Div P 0 Box 989 Chattanoga Tenn (27-28)

  PHELPS DOGGE COPPER PRODUCTS CORP 300
  Park Ave New York 22 NY (1-3-4-7 thru 11-1517 thru 22)—ADV PG 76-77
  Plastic Wire & Cable Corp E Main St Jewett
  City Conn (17-19-20-23)
  Plastoid Corp 42-61 24th St LIC 1 NY (1-1718-19-20)
  Padix Wire Co. 26260 Lakeland Blvd Cleveland 32
- 18-19-20)
  Radix Wire Co 26260 Lakeland Blvd Cleveland 32
  Ohio (1-2-4-6-17-18-19-20)
  Reynolds Metals Co Richmond 18 Va (27-28)
  Rhode Island Insulated Wire Co Inc 50 Burnham Ave
  Cranston Ri (1-6-17-21)

- Rhode Island Insulated Wire Co Inc 50 Burnham Ave Cranston RI (11-6-17-21)
  Rockbestos Wire & Cable Co Nicoli and Canner Sts New Haven 4 Conn (1-2-4-18-21-25)
  Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 N (7-9-10-11-16-17-19-20-21-22)
  ROME CABLE DIV OF ALCOA 421 Ridge St Rome NY (6-9-10-16-19-20-22-23)—ADV PG 42
  Royal Electric Corp 95 Grand Ave Pawtucket RI (1)
- R1 (1)
  Simplex Wire & Cable Co 79 Sidney St Cambridge
  39 Mass (2-4-6 thru 11-17-19-20-21)
  Southwire Co Carrollton Ga (6-16-17-19-20-22-
- 23)
  TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1-2-3-4-6-8 thru 11-16-17-19-20-21)—ADV PG 3rd cover Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (19)
  Walker Brothers P O Box 33 Conshohocken Pa (6-9-10-11-16-19-20-22)
- restern Insulated Wire Co 2425 E 30th St Angeles 58 Calif (1-2-3-4-6-9-10-11-16-21)

- American Electric Cable Co 181 Appleton St Holyoke Mass (9-10)

  American Insulated Wire Corp 36 Freeman St Pawtucket Ri (1 thru 6-9-10)

  AMERICAN STEEL & WIRE DIV UNITED STATES STEEL CORP Rockefeller Bldg Cleveland 13 Ohio (5-6-9-10)—ADV PG 72-73

  Anaconda Wire & Cable Co 25 Broadway New York 4 NY (9-10)

  Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (9-10)

  Brand (William) American Enka Corp 31 Sudbury Brand (William)
- NY (9-10)

  Brand (William) American Enka Corp 31 Sudbury
  Rd Concord Mass (7-8-9-10)

  Chester Cable Corp Oakland Ave Chester NY
  (9-10)
- (9-10)

- (9-10)

  Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (2 thru 6-9-10)

  Collyer Insulated Wire Corp 249 Roosevelt Ave Pawtucket RI (1-3 thru 10)

  Continental Wire Corp P 0 Box 366 Wallingford Conn (1-2-7-8-9-10)

  Cornish Wire Co Inc 50 Church St NY 7 NY (3-9-10)

  CRESCENT INSULATED WIRE & CABLE CO 319 N Olden Ave Trenton 5 NJ (3-4-5-6-9-10)—ADV PG 95

  Diamond Wire & Cable Co 445 Park Ave Sycamore
- iamond Wire & ( Cable Co 445 Park Ave Sycamore

- III (1 thru 10)

  Essex Wire Corp Wire & Cable Div 2601 S Adams
  Marion Ind (5-6-7-8-9-10)

  ETTCO WIRE & CABLE CORP 75 Onderdonk Ave
  Brooklyn 37 NY (19)—ADV PG 216

  GENERAL CABLE CORP 730 Third Ave
  New York
  17 NY (1 thru 10)—ADV PG 28-20
  General Electric Co Wire & Cable Dept 1285
  Boston Ave Bridgeport 2 Conn (1-3-4-7-8-9-10)
- 9-10)
  HATFIELD WIRE AND CABLE DIV CONTINENTAL
  COPPER & STEEL INDUS INC 487 Hillside Ave
  Hillside 5 NJ (6-9-10)—ADV PG 89
  Lewis Engineering Co 52 Rubber Ave Naugatuck
  Conn (1)
- Mille tric Co 120 Main St Pawtucket RI
- Miller Electric Co 120 Main St Pawtucket RI (1-2-9-10)

  NATIONAL ELECTRIC DIV H K PORTER CO INC Porter Bldg Pittsburgh 19 Pa (1-5-6-7-8-9-10) ADV PG 67-98

  Okonite Co Passaic NJ (1-3-4-5-6-8-9-10) Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (9-10)

  PHELPS DOOGE COPPER PRODUCTS CORP 300 Park Ave New York 22 NY (1-3-4-5-6-9-10) ADV PG 76-77

  Plastic Wire & Cable Corp E Main St Jewett City

- ADV PG 76-77

  Plastic Wire & Cable Corp E Main St Jewett City
  Conn (9-10)

  Plastoid Corp 42-61 24th St LIC 1 NY (9-10)

  Radix Wire Co 26260 Lakeland Blvd Cleveland 32
  Ohlo (1-9-10)

  Rockbestos Wire & Cable Co Nicoll and Canner Sts
  New Haven 4 Conn (1)

  ROME CABLE DV OF ALCOA 421 Ridge St Rome
  NY (1 thru 10)—ADV PG 42

  Royal Electric Corp 95 Grand Ave Pawtucket RI
  (1-2-3-9-10)
- Royal Electric (1-2-3-9-10)

- (1-2-3-9-10)

  Simplex Wire & Cable Co. 79 Sidney St. Cambridge 39 Mass (3 thru 10)

  Surprenant Mfg Co. 199 Washington St. Boston 8 Mass (9-10)

  TRIANGLE CONDUIT & CABLE CO. INC. Triangle & Jersey Aves. New Brunswick NJ (1 thru 10)—ADV PG 3rd cover Victor Electric Wire & Cable Corp. 618 Main St. West Warwick RI (9-10)

  Walker Brothers P. O. Box 33 Conshohocken Pa (9-10)

  Western Insulated Wire Co. 2007 F. School Conductions of the conduction of the conduction
- estern Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (1-4)

#### **6B. FIXTURE WIRE**

- 1. AF—heat-resistant asbestos-covered
  2. CF—heat-resistant cotton-covered
  3. FF—rubber-covered flexible stranding.
  4. FFH—heat-resistant rubber-covered flexible stranding
  5. RF—rubber-covered, solid or 7-strand
  6. RFH—heat-resistant rubber-covered solid or 7-strand
  7. SF—silicone rubber, solid or 7-strand
  8. SFF—silicone rubber, solid or 7-strand
  9. TF—thermoplastic-covered, solid or stranded
- 10. TFF—there -thermoplastic-covered, stranding
- Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (5-9-10)
  Acorn Insulated Wire Co 36 Freeman St Pawtucket RI (1 thru 6-9-10)

#### AC. FLEXIBLE CORD

- AFC, AFPD, AFPO—asbestos-covered, heat-resistant
   AFS, AFSJ—rubber-jacketed, heat-re-sistant
   AVPD, AVPO—heat- and moisture-re-sistant
   C—lamp
   CA—armored
   CFC, CFPD, CFPO—cotton-covered, heat-resistant

7. E, EO, ET—elevator cable
8. HC, HPD—heater
9. HPN—heater, all, neoprene
10. HS—heater, locketed
11. HSJ—heater, rubber-jacketed
12. K—heavy-duty, braided
13. P—reinforced
14. PD—twisted portable
15. PO—parallel
16. PW—reinforced, moistureproof
17. S, SO, ST—hard service, junior
19. SP—parallel, all rubber
20. SPT—parallel, all plastic
21. SR, SRT—range cable
22. SV, SVT—vacuum cleaner
23. TP, TPT, TS, TST—tinsel

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (2-4-7 thru 23) Acorn Insulated Wire Co 36 Freeman St Paw-tucket RI (1-3-4-6-8 thru 22) Alpha Wire Corp 200 Varick St New York 14 NY (15-17-19-20-22)

NY (15-17-19-20-22)

American Insulated Wire Corp 36 Freeman St
Pawtucket RI (1-2-4-6-8-9-10-11-13-14-15-1718-19-20-22)

MAMERICAN STEEL & WIRE DIV UNITED STATES
STEEL CORP Rockefeller Bidg Cleveland 13
Ohio—ADV PG 72-73
Anaconda Wire & Cable Co 25 Broadway New York
4 NY (12-17-18)
Apex Wire & Cable Corp 237 2745 58 Best St

Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (8-15-20) 32 NY (8-15-20) Elden Mfg Co P O Box 5070A C (8-9-10-11-17-18-19-20-21-22-23) Chicago 80 III Oakland Ave Chester NY (17-18-20-22)

(17-18-20-22)
Circle Wire and Cable Corp 5500 Maspeth Ave Maspeth L1 NY (4-5-12-13-14-17-18-19-20-21)
Collyer Insulated Wire Co 249 Rossevelt Ave Pawtucket R1 (1-2-3-7-17-18-21-22)
Columbia Cable & Electric Corp 255 Chestnut St Brooklyn 8 NY (5)
Continental Wire Corp P 0 Box 366 Wallingford
Continental Wire Corp P 0 Box 366 Wallingford

Con (1-3-67)

Irrish Wire Co Inc 50 Church St NY 7 NY (4-8-9-11-15-17-18-20-22)

(4-8-9-11-15-17-18-20-22)
Crescent Co Inc 20 Central Ave Pawtucket RI
(4-15-17-18-19-20-22)
CRESCENT INSULATED WIRE & CABLE CO 319
N Olden Ave Trenton 5 NJ—ADV PG 95
Diamond Wire & Cable Co 445 Park Ave Sycamore
III (4-5-6-8-10-14-15-17 thru 23)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (20) Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (4-7-8-9-11-12-13-15-17-18-

Adams Marion Ind (4-7-8-9-11-12-13-15-17-18-19-20-21-22)

GENERAL CABLE CORP 730 Third Ave New York
17 NY (1 thru 22)—ADV PG 82-83
General Electric Co Wire & Cable Dept 1285 Roston Ave Bridgeport 2 Conn (1-2-3-8-9-15-17-18-19-20-21-24)

Legislat Wire Work 49 Cordon Ave

18-19-20-21-22)
General Insulated Wire Works 69 Gordon Ave
Providence 5 RI (8 thru 11-17 thru 23)

HATFIELD WIRE AND CABLE DIV CONTINENTAL
COPPER & STEEL INDUSTRIES INC 487 Hillside
Ave Hillside 5 NJ (4-7 thru 23)—ADV PG 89
Kaiser Aluminum & Chemical Sales Inc Kaiser Center
300 Lekeside Dr Oakland 12 Calif (7-17-1820-22)

Millier Electric Communication Communica

20-22)
Miller Electric Co 120 Main St Pawtucket RI (1-3-4-6-8-14-15-17-18-20-21-22-23)
NATIONAL ELECTRIC DIV H K PORTER CO INC Porter Bldg Pittsburgh 19 Pa (1-2-18)—ADV PG 97-98

PG 97-98
Normandy Electric Wire Corp 125 Second St
Brooklyn 31 NY (17)
Okonite Co Passaic NJ (2-4-7-17 thru 21)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (18-20-21-22-23)

bury Mass (18-20-21-22-23)

PHELPS DODGE COPPER PRODUCTS CORP 300
Park Ave New York 22 NY (4-17-18-19-20-22)
—ADV PG 76-77

—AUV PG 16-77

Plastic Wire & Cable Corp E Main St Jewett
City Conn (17-18-20-21-22-23)

Plastoid Corp 42-61 24th St LIC 1 NY (5-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32
Ohio (1-20)

Rockbestos Wire & Cable Co Nicoll and Canner Sts New Haven 4 Conn (1-3) Roebling's (John A) Sons Corp 640 S Broad St Trenton 2 NJ (7-17)

ROME CABLE DIV OF ALCOA 421 Ridge St Rome NY (7-17 thru 22)—ADV PG 42

Royal Electric Corp 95 Grand Ave (1-4-6-8-9-10-11-13 thru 23)
Shallcross Controls Inc 2217-21 N 31 St Milwau-kee 8 Wis (1)

Simplex Wire & Cable Co 79 Sidney St Cambridge 39 Mass (2-3-5-7-9-10-12-13-14-16 thru 21)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (8-10-15-17-18-22)

Triangle Conduit & Cable Co Inc Triangle & Jersey Aves New Brunswick NJ (1-2-6-15-17-18-21-29-31-32)

Victor Electric Wire & Cable Corp 618 Main St West Warwick RI (20-22-23) Walker Brothers P 0 Box 33 Conshohocken Pa (17-21)

Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (2-14-15-17-18-21-22) Whitney Blake Co 102 Pershing St New Haven 14 Conn (4-9-11-17-18-19-20-22) 6D. SPECIFIC APPLICATIONS OF WIRE &

Airport Applian Barn Born
Brewery
Bridge
Control
Electric furnace
Elevator
Gos tube sign
Ground
Heater
Lamp
Magnet
Marine
Parkway (Suburi

Marine
Marine
Parkway (Suburban)
Railway
Service drop
Service entrance
Signal & communications
Stage lighting
Submarine
Thermostat
Welding
Water-cooled leads
Lead wire
Electric fence
Trolley
Annunciator
Fixture
Bus drop

Fixture
Bus drop
Series street lighting
Pump
Cathodic protection
Trailer
High voltage
Machiner tool
Building
Portable power
High frequency (Litz)

Accurate Insulated Wire Corp 25 Fox St Haven 13 Conn (1-2-6-8-11-12-15-19-20) Accrn Insulated Wire Co 36 Freeman St tucket RI (2-3-4-6-10-11-12-17-18-19-20) Alpha Wire Corp 200 Varick St New York 14 NY (1-2-6-13-19-25)

(1-2-6-13-19-25) Alphaduct Wire & Cable Co 25 Van Dyke Ave (P 0 Box 709) New Brunswick NJ (19) American Electric Cable Co 181 Appleton St

(P O Box 709) New Brunswick NJ (19)
American Electric Cable Co 181 Appleton St
Holyoke Mass (2-6-9-12-19-20)
American Insulated Wire Corp 36 Freeman St
Pawtucket RI (1-2-3-4-6-11-12-15-17-18-19-20)

AMERICAN STEEL & WIRE DIV UNITED STATES
STEEL CORP Rockefeller Big Cleveland 13
Ohio (1-2-6 thru 11-13 thru 21)—ADV PG 72-73
American Super-Emperature, Wires Lee. American Vt (13)

vt (13) Anaconda Wire & Cable Co 25 Broadway New York 4 NY (1 thru 21) Ansonia Wire & Cable Co 111 Martin St Ashton RI (1-6-19)

Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (2-11-12) NY (2-11-12) Belden Mfg Co P O Box 5070A Chicago 80 III (2-9-11-12-13-14-19-23)

Pand (William) & Co Inc 51 North St Willimantic Conn (2-6-19) Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (20)

nester Cable Corp Oakland Ave Chester NY (2-3-6-9-12-19-20)

rcle Wire and Cable Corp 5500 Maspeth Ave Maspeth LI NY (1-2-3-5-6-8-14-15-17-18-19-20)

19-20)
Collyer Insulated Wire Co 249 Roosevelt Awe Pawtucket RI (2 thru 8-10-12-14 thru 20-23-38)
Columbia Wire & Supply Co 2850 Irving Park Rd Chicago 18 III (19)
Continental Wire Corp P O Box 366 WallIngford Conn (6-22)

opperweld Steel Co Wire and Cable Dlv Glassport Pa (19) raish Wire Co Inc. 50 Church St. NY 7 NY (2-19-20)

Crescent Co Inc 20 Central Ave Pawtucket RI (12-17)

OCRESCENT INSULATED WIRE & CABLE CO 319
N Olden Ave Trenton 5 NJ (4 thru 8-10-1215 thru 20)—ADV PG 95

Diamond Wire & Cable Co 445 Park Ave Sycamore 111 (2-4-6-7-8-11-12-15-17-18-19-20) Driver (Wilbur B) Co 1875 McCarter Highway Newark 4 NJ (7-11)

Essex Wire Corp. Wire & Cable Div. 2601 S Adams Marion Ind (1-2-3-4-6-8-9-10-11-12-15-17-18-19-20) ar Wood Industries Inc Wayne Mich (23)

Gar Wood Industries Inc Wayne Mich 1223

GENERAL CABLE CORP 730 Third Ave New York

17 NY (1 thru 23-25-27-28-29 thru 35)—

ADV PG 82-83 General Electric Co Wire & Cable Dept 1285 Boston Ave Bridgeport 2 Conn (1-2-6-9-11-13-

Boston Ave Brid 14-15-18-19-21) General Insulated Wire Works 69 Gordon Ave Providence 5 RI (2-6-10-11-17-18-19)

Providence 5 RI (2-6-10-11-17-18-19)

GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY (2-6-12-13-17-18)—ADV PG 2

HATFIELD WIRE AND CABLE DIV CONTINENTAL COPPER & STEEL INDUSTRIES INC 487 Hillside Ave Hillside 5 NJ (1-2-3-4-6-8-9-11-12-14 thru 20-23-29-35)—ADV PG 89

Cardial Miles & Cable Carp Milford NH (17) Hendrix Wire & Cable Corp Milford NH (17)

Hitemp Wires Co 1200 Shames Dr Westbury NY (13-19)

Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lakeside Dr Oakland 12 Calif (1 thru 6-8-10-14 thru 19-21-23-25-30-31-32-34-35)

A 34-35)

Kennecott Wire & Cable Div Okonite Co Phillipsdale (Rumford 16) R I (7-13-16-19)

Lincoln Electric Co 22801 St Clair Ave Cleveland 17 Ohio (23)

Markel (L. Frank) & Sons Morristown Pa (25)

Miller Electric Co 120 Main St Pawtucket RI (11-12-19-22-28-29)

Narragansett Wire Co 1125 Main St Pawtucket RI (11-6-10-17-18)

National Electric Div H K Porter Co Inc Porter Bidg Pittsburgh 19 P (26-610-14-17-18-19-21)

National-Standard Co 601 N 8th St Niles Mich (10-16-17-19)

New England Electrical Works Inc 365 Main St

National-Standard Co 601 N 8th St Niles Mich (10-16-17-19)
New England Electrical Works Inc 365 Main St Lisbon NH (10-13-19-39)
Nichols Wire & Aluminum Co 1725 Rockingham Rd Davenport Iowa (26)
Normandy Electric Wire Corp 125 Second St Brooklyn 31 NY (14)
Okonite Co Passaic NJ (1-5-6-7-8-9-12 thru 21)
Olin Conductors Metals Div P O Box 989 Chattanoga Tenn (17)
Page Steel & Wire Div American Chain & Cable Co Inc P O Box 692 Monessen Pa (23)
Partrick & Wilkins Co 51 N Seventh St Phila 6-Pa (20)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (2-6-8-19)

PMELPS DOOGE COPPER PRODUCTS CORP 300
Park Ave New York 22 NY (1-2-3-6-9-10-13-15-17-18-19)—ADV PG 76-77
Plastic Wire & Cable Corp E Main St Jewett City Conn (2-3-6-9-15-19-20)
Plastoid Corp 42-61 24th St LIC 1 NY (2-6-9-12-19-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32

12-19-20)
Radix Wire Co 26260 Lakeland Blvd Cleveland 32
Ohio (2-3-6-7-10-11-12-19-20-32-34)
Rees (Mackworth G) Inc 1573 E Forest Ave
Detroit 7 Mich (23)
Reynolds Metals Co Richmond 18 Va (17)
Rhode Island Insulated Wire Co Inc 50 Burnham
Ave Cranston RI (2-11-12-19)
Ringsdorff Carbon Corp Box 22 East McKeesport
Pa (27)

Pa (27)
Rockbestos Wire & Cable Co Nicoll and Canner Sts
New Haven 4 Conn (2-6-7-8-19-21)
Roebling's (John A) Sons Corp 6-80 S Broad St
Trenton 2 NJ (1-6-7-8-10-13-15 thru 19-21)
ROME CABLE DIV 0F ALCOA 421 Ridge St
Rome NY (1-2-6-8-10-12-13-14-16 thru 20-23-37)—ADV PG 42
Rowal Flactric Corp 95 Grand Ave. Pawdurket Royal Electric Corp 95 Grand Ave Pawtucket RI (2-4-6-9-11-12-19-20-22-23-28-29-36)

Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (22)

Conn (22)
Sequoia Wire & Cable Co 2201 Bay Rd (P 0
Box 1007) Redwood City Calif (2-6-19-20)
Simplex Wire & Cable Co 79 Sidney St Cambridge
39 Mass (19)
Sittler Corp 18 N Ada St Chicago 7 III (10-19)
South River Metal Products Co Inc 377 Turnpike
South River No (10)
Southwire Co Carroliton Ga (3-6-10-17-19)
Star-A Electric Mfg Co Inc 269 Meserole St
Brooklyn 6 NY (2-11-12)
Surprenant Mfg Co 199 Washington St Boston 8
Mass (2-6-19)

Brooklyn 6 N Surprenant Mfg ( Mass (2-6-19) P O Box 216 Pacific Palisades Calif (19-21)

Tensolite Insulated Wire Co Inc West Main St Tarrytown NY (2-6-13-19)
Tevco Insulated Wire 108 E Prospect Ave Burbank Calif (19)
Times Wire & Cable Div International Silver Co Wallingford Conn (6)
Titchener (E H) & Co 67 Clinton St Binghamton NY (10)
TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1-2-6-15-17-18-21-29-31-32)—ADV PG 37d Cover
Victor Electric Wire & Cable Corp 618 Main St West Wast Warwick RI (2-6-12-19)
Walker Brothers P 0 Box 33 Conshohocken Pa (6-18-19)
Watteredge Co 19629 West Lake Rd Rocky River

(6-18-19)
Watteredge Co 19629 West Lake Rd Rocky River
16 Ohio (24)
Western Insulated Wire Co 2425 E 30th St Los

Western Insulated Wire Co 2425 E 30th St Los Angeles 58 Calif (2-4-6-10-15-17-18-20-23-38)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 21)—ADV PG 2nd Cover Whitney Blake Co 102 Pershing St New Haven 14 Comm (6-10-16-19)

6E. PORTABLE CORD SETS Extension of the Country of the Coun

Includes sets with appropriate con-bodies at both ends. For cords with attached, see "Trouble Lamps" in For cord without connectors, see "Co-

Accurate Insulated Wire Corp 25 Fox St New Haven 13 Conn (1-2-3-4)
Accorn Insulated Wire Co 36 Freeman St. Pawtucket RI (1-3)

RI (1-3)
American Electric Cable Co 181 Appleton St
Holyoke Mass (1)
Anaconda Wire & Cable Co 25 Broadway New
York 4 NY (1-3) Apex Wire & Cable Corp 237 37th St Brooklyn 32 NY (1-2)

32 NY (1-2)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (7)
Associated Engineering Corp 65 Kent St Brookline 46 Mass (1-2)
B & M Electric Corp 168 7th St Brooklyn 15 NY (1-2-2)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (1-2)
Belden Mfg Co P 0 Box 5070A Chicago 80 III (1-2-3) (1-2-3)Electric Co 1844-50 W 21 St Chicago 8 [[] (1)

III (1)

Benjamin Reel Products Inc 10700 Broadway
Cleveland 25 Ohlo (1.7-8)

Black (M) Mfg Co 300-08 N Third St Phila 6
Pa (1)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (1.3-5)

Capitol Stage Lighting Co Inc 527 W 45 St New
York 36 NY (1)
Carol Cable Co 190 Middle St Pawtucket RI
(1)

Carol (1) Circle F NJ (3) F Mfg Co 720 Monmouth St Trenton 4 NJ (3) rdomatic Div Vacuum Cleaner Corp of America 1724 W Indiana Ave Phila 32 Pa (4) rmish Wire Co Inc. 50 Church St. NY 7 NY

Crescent Co Inc 20 Central Ave Pawtucket RI (1-2) Diamond Wire & Cable Co 445 Park Ave Sycamore III (1-2-3-4)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 WY (1-2-3) Eastern Insulated Wire Corp Trenton NJ (2-5) Electri-Cord Mfg Co Inc 2554-2568 E 18 St Brooklyn 35 NY (5) Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (1-2-7) Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (3) Faraday Inc 2011 W Beecher Rd Adrian Mich (2) Gem Electric Mfg Co Inc 237 277 5

Gem Electric Mfg Co Inc 237 37th St Brooklyn General Cable Corp 730 Third Ave New York 17 NY (1-2-3-4)

NY (1-2-3-4)
General Electric Co Wire & Cable Dept 1285
Boston Ave Bridgeport 2 Conn (1-3)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-2-3)
General Insulated Wire Works 69 Gordon Ave
Providence 5 RI (1-2-4)
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY

(1)
Kaiser Aluminum & Chemical Sales Inc Kaiser Center 300 Lakeside Dr Oakland 12 Calif (2) Koiled Kords Inc Box K Hamden Conn (4) Midwest Electric Products Inc 1515 N Front St Mankato Minn (3)
Miller Electric Co 120 Main St Pawtucket RI

Miller Electric (1 thru 6) Murray (1-2) (D A) Co Inc 632 N Mill St Tipton Ind

murray (D A) Co Inc 632 N Mill St Tipton Ind (1-2)
Phalo Plastics Corp 530 Boston Turnpike Shrewsbury Mass (1-2-3)
PHELPS DODGE COPPER PRODUCTS CORP 300
Park Ave New York 22 NY (1)—ADV PG 76-77
Plastic Wire & Cable Corp E Main St Jewett
City Conn (1-2-3-4)
Rhode Island Insulated Wire Co Inc 50 Burnham
Ave Cranston RI (1)
Riverside Mfg & Electrical Supply Co 1022B
Michigan Ave Dearborn Mich (2)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (1-3)
Royal Electric Corp 95 Grand Ave Pawtucket RI (1-3)
Seeger-Williams Inc 4 Norman St Beidenand

Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (2) Conn (2)
Standard Portable Cord Co Inc Mayville NY (1)
Star-A Electric Mfg Co Inc 269 Meserole St
Brooklyn 6 NY (1.3)
Victor Electric Wire & Cable Corp 618 Main St
West Warwick RI (2)
Wilkoff (M N Co 823 Locust Pittsburgh 19 Pa

#### 6F. CONNECTING & TERMINATING DEVICES

Connectors—pressure
 Connectors—solderless
 End seals
 Lugs & terminals

5. Pathends
6. Splices, kits & equipment
7. Terminal blocks & binding posts
8. Screw-on wire connectors
9. Collecting rings, shoes & devices
10. Ground clamps
11. Welding coble connectors
12. Lifting magnet connectors
13. Environment-resistant connectors
14. Tube-to-cable connectors
15. Temporary power connectors
16. Power connectors
16. Power connectors
17. Split-tinned connectors
18. Total connectors
19. Split-tinned connectors

Accessories used for splicing, terminating, or connecting wire and cable to equipment or fittings.

AMP Inc Eisenhower Blvd Harrisburg Pa (1-4-6) APM Corp 41 Honeck St Englewood NJ (16) Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (3-5)

Allen-Bradley Co 136 W Greenfield Ave Milwaukee 4 Wis (7) Industries Inc P O Box 119 Ogallala Neb (3)

Neb (3)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (5-6)
Anderson (Albert & J M) Mfg Co 289 A St Boston 10 Mass (11-15)
Anderson Electric Corp P 0 Drawer 2151 Birmingham 1 Ala (1-3-4-6-10)
Anthony (F M) Co 773 University Ave Berkeley 10 Calif (1-4-6)
Bishop Mfg Corp 10 Canfield Rd Cedar Grove (6)

(6)
Blackburn (Jasper) Corp 1525 Woodson Rd St Louis 14 Mo (1-4)
Blaco Mfg Co 6541 Euclid Ave Cleveland 3 Ohio Blaco (10)

Bridgeport Fittings Inc 209 Center St Bridgeport 2 Conn (10-14)

2 Conn (10-14)

BUCHANAM ELECTRICAL PRODUCTS CORP 434 US
Route 22 Hillside NJ (1-4-6-7)—ADV PG 110118-120

Burndy Corp Norwalk Conn (1-4-6-7-8)
Cam-Lok Div Empire Products Inc 9213 Blue Ash
Rd Cincinnati 42 Ohio (1-4-6)
Camblock Corp 825 Bronx River Ave New York 72
NY (7) Prospisio Co. 507 Pailland St. Columbiano.

Central Porcelain Co 507 Railroad St Columbiana Ohio (1-8) ●CROUSE-HINDS CO Syracuse 1 NY (13)—ADV

(10)

Old Dosset Mfg Corp 249-255 Huron St Brooklyn 22 NY (1-4-6) ETC Inc 990 E 67 St Cleveland 3 Ohio (1-4) Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (8) Earl (H W) & Co 6225 S W 8th St Miami 44 Fla (11-12) Earl Electric Mfg Corp 35-20 Borden Ave Long Island City NY (4) Eastern Specialty Co 3617 N 8th St Phila 40 Pa (7) Eastern S Pa (7) Flectro Dynamics Corp 4917 St Elmo Ave Bethesda 14 Md (1-2)

14 Md (1-2) Elliott Electric Mfg Corp 50-30 98th St Corona 68 NY (1-3-4-6-8) Emerson Plastics Corp 1383 Seabury Ave Bronx 61 Emerson Plastics Corp 1383 Seabury Ave Bronx 61 NY (7)
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (1.4-11)
Esco Mfg Co P 0 Box 1039 Greenville Texas (5) Fargo Mfg Co Inc 845 Main St Poughkeepsie NY (1)

Frankel Connector Co 27 Vestry St NY 13 NY (2-4) (2-4)
6 & W Electric Specialty Co 3500 W 127 St Blue Island III (3-5-6)
General Electric Co Wiring Device Dept 95 Hathaway St Providence RI (1-4)
General Products Corp 107 Salem St Union Springs NY (7)
Green (R H) Inc 1201 24th St Oakland 7 Calif (10)

NY (7)
Green (R H) Inc 1201 24th St VENAUL (10)
Hall (William) Co Canal Bank Windsor Locks
Conn (6)
Hessel : N F) Co Inc 74 Beekman St NY 38 NY
(7-11-15)
Hi-Scale Products Corp 132 W 22nd St NY 11

Hoffman Engineering Corp 1050 Tyler St Anoka Winn (15)

Hollingsworth Co Solderless Terminal Div Box 430 Phoenixville Pa (1) Industries Inc 442 Elm St Sycamore III Husky Prod Ohio (6) oducts Inc 5300 Vine St Cincinnati 17

Onio (6)

IDEAL INDUSTRIES INC 5136 Park Ave Sycamore
III (1-8)—ADV PG 103
Ilsco Corp 4730 Madison Rd Cincinnati 27 Ohio
(1-7)

Joslyn Mfg & Supply Co 3700 S Morgan St Chicago 9 III (1-6) Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (1-5-6) Joy Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (1-3-5)

Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (1) Kotton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (1-4-7) Kortick Mfg Co 5600 Third St San Francisco 24 Calif (10) Calif (10)
Krueger & Hudepohl Inc 1041 Evans St Cincinnati 4 Ohio (1-4)
Kulka Electric Corp 633 S Fulton Ave Mount
Vernon NY (1-4-7)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1-6)
Lint (Clyde W) 2323 W 18 St Chicago 8 III (1)

M & W Electric Mfg Co Inc S Walnut St (P O Box 87) East Palestine Ohio (10)

Marathon Special Products Corp 12th & Cranberry Sts Erie Pa (7)

Marshall (John) Associates Inc Box 2463 Bridgeport & Conn (1)

Mend-it Sleeve Mfg Co 3125 Gloria Terrace Lafayette Calif (1)

Mercury Products Inc Boston Post Rd Guilford Conn (2-4-10)

Metalectrics Inc 627 Greenwich St New York 14

NY (1-8)

Midwest Electric Mfg Co 1639 Walnut St Chi-

NY (1-8)

Midwest Electric Mfg Co 1639 Walnut St Chicago 12 111 (10)

Minnesota Mining and Mfg Co Electrical Products

Div 900 Bush Ave St Paul 6 Minn (1-6)

O Z ELECTRICAL MFG CO 1MC 262 Bond St

Brooklyn 17 NY (1-4-10-14)—ADV PG 107

Ohio Brasa Co 380 N Main St Mansfield Ohio (5)

Okonite Co Passaic NJ (6)

PLM PRODUCTS INC 3871 W 150 St Cleveland 11

Ohio (5-6)—ADV PG 102

(1-6-17)

Penn-Union Electric Corn 315 State St Frie Pa

Penn-Union Electric Corp 315 State St Erie Pa (1-2-4-6-7-10-14) Porcelain Products Co 224 N Patterson St Carey Ohio (2-10)

Ohio (2-10)
Preformed Line Products Co 5349 St Clair Ave Cleveland 3 Ohio (6)
Rattan Mfg Co 10 Wall St (P 0 Box 1745) New Haven 7 Conn (1-10-17)
Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (3)

Richar Mfg Co Ltd 152 Coit St Irvington NJ Richards Mfg Co Ltd 152 Coit St Irvington NJ (1.4-6)
Ringsdorff Carbon Corp Box 22 McKeesport Pa (9)
Rusgreen Mfg Co 14262 Birwood Awe Detroit 38
Mich (1.4-5-6)
Sherman (H B) Mfg Co 22 Barney Battle Creek
Mich (1)
Southern Electrical Equipment Co 308 W Bland
at Mint St Charlotte 3 NC (1)
Square D Co Executive Plaza Park Ridge III
(4-7)
Standard Electric Time Co 89 Logan St Soring-

(4-7)
Standard Electric Time Co 89 Logan St Spring-field 2 Mass (7)
Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (8)
States Co 19 New Park Ave Hartford 6 Conn (7)
Superior Electric Co 83 Laurel St Bristol Conn (7)

Surprenant Mfg Co 199 Washington St Boston 8
Mass (3)
Suttle Equipment Corp 135 S LaSalle St Chicago
3 III (7) 3 111 (7)
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ
(1-4-6-8)
Unimatic Corp Sherwood Lane Caldwell NJ (1)
Vaco Products Co 317 E Ontario St Chicago 11
III (7)
Wama Co Industrial Bldg Baltimore 2 Md (7)
Watteredge Co 19629 West Lake Rd Rocky River
16 Ohio (4)
WEAVER (J A) CO 2110 Howard St St Louis 6
Vorkville Metal Products Co 627 Greenwich St
New York 14 NY (1-8)

#### 6G. CONDUCTOR SUPPORTS

Bushing insulators & wireholders
 Open wiring cleats, knobs & tubes
 Hangers & grips
 Racks, framing & ladders
 Staples, clamps, clips & straps
 Trays
 Troughs
 Drive & bridle rings
 Cable ties
 Cable spacers

Accessories for holding wire and cable in place from source to load. See also "Race-

Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (1) Allen-Stevens Conduit Fittings Corp 33-53 62nd St Woodside 77 NY (5) Allis-Chalmers Mfg Co 930 S 70 St Milwaukee 1 Wis (1)
American Steel & Iron Works 5801 S Lowe Ave
Chicago 21 111 (4)
Anderson Electric Corp P O Drawer 2151 Birmingham 1 Ala (5) Wis (1)

Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY (5)

Mass (5)
Bay-Tronic Co 43 Evergreen St Bayonne NJ (10)
BBLACKHAWK INDUSTRIES 250 S Main St Iowa (1)—ADV PG 88
Bridgeport Fittings Inc 209 Center St Bridgeport 2 Conn (1-5)
Buchanan Electrical Products Corp 434 U S Route 22 Hillside NJ (5)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (5)
Canson Mrg Co 2565 W Fullerton Ave Chicago 47 dence 7 RI (5) Capson Mfg Co 2565 W Fullerton Ave Chicago 47 III (5) Central Porcelain Co 507 Railroad St Columbiana Ohio (2)

Central Processian Co 507 Ratirolas St. Columbiana
Ohio (2)
CHALFANT PRODUCTS CO INC 11525 Madison Ave
Cleveland 2 Ohio (4-6-7)—ADV PG 94
Cope (T J) Div Rome Cable Corp Third & Walnut
Sts Collegeville 5 Pa (4-7)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (2-3-6-7)
Dolco Mfg Co 2350 Curry St Long Beach 5 Calif
(10)

EFFICIENCY ELECTRIC & MFG CO Park Ave Ext
(P O Box 30) East Palestine Ohio (1-2-4)—
ADV PG 120-122
Electrovert Inc 124 E 40 St New York 16 NY

Electrovert Inc 124 E 40 St New York 16 NY (5-9) Eliza Metal Products Co Box 408 Birdgeville Pa. ott Electric Mfg Corp 50-30 98th St Corona B NY (1) merson Apparatus Co 171 Tremont St Melrose Mass (5) mass 13/ Emerson Plastics Corporation 1383 Seabury Ave Bronx 61 NY (1) Prico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (5) Ohio (5)
Fasform Div Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio (8) gie Ave Cleveland 1 Ohio (8)
Fletcher Mfg Co Box 246 Englewood Ohio (4-5)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe
Pa (5) G-C Electronics Co 400 S Wyman St Rockford III General Metals Inc 858 Goldsbro Greensboro NC (7) Glastic Corp 4321 Glenridge Rd Cleveland 21 Ohio (1) Greene (R H) Inc 1201 24th St Oakland 7 Calif (5) all (William) Co Canal Bank Windsor Locks Conn (3-5) Conn (3-5)
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa (4)
Hendrix Wire & Cable Corp Millford NH (10)
Heyman Mfg Co Kenilworth 20 NJ (1)
Hoffman Engineering Corp 1050 Tyler St Anoka Min (7)
Holub Industries Inc 442 Elm St Sycamore III (5) (5) Husky Products Inc Ohio (3-4-5-6-7) Johns-Manville 22 E 40 St New York 16 NY (6) Jordan Industries Inc 3030 N W 75 St Miami 47 Fla (5) Fia (5)
Joslyn Mfg & Supply Co 3700 S Morgan St Chicago
9 III (1)
Kellems Co Inc 15 Williams St Stonington Conn

Kellems Co Inc 15 Williams St Stonington Conn (3)

MKEYSTONE MFG CO 23328 Sherwood Rd Warren Mich (7)—ADV PG 123

Knox Porcelain Corp 2706 Mynders Ave (P 0 Box 2031) Knoxville 1 Tenn (2)
Liebfried (H) Mfg Corp 95-101 Guernsey St Brooklyn 22 NY (3-4)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (4)
Lint (Clyde W) 2323 W 18 St Chicago 8 III (2)
M & T Welding Products Corp 703 37th Ave Oakland Calif (4)
M & N Electric Mfg Co Inc S Walnut St (P 0 Box 87) East Palestine Ohio (4)
Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (5-6)
Maryland Lava Co Box 127 Bel Air Md (1)
Merwin Mfg Co 19th & German Sts Erie Pa (5)
Metalectrics Inc 627 Greenwich St New York 14
NY (1)

Midwest Electric Mfg Co 1639 Walnut St Chicago 12 III (5) Minerallac Electric Co 25 N Peoria St Chicago 7 Atlas Tack Corp Pleasant & South Sts Fairhaven
Mass (5)

Mineraliac Electric Co. 111 (1)

O Z ELECTRICAL MFG CO INC 262 Bond St. Brooklyn 17 NY (1)—ADV PG 107

Olin Conductors Metals Div P 0 Box 989 Chattanooga Tenn (10)

PLM Products Inc 3871 W 150 St. Cleveland 11

Ohio (10)

Ohio (10)

P-W INDUSTRIES INC 11200 Roosevelt Blvd
Philadelphia 15 Pa (4-7)—ADV PG 112

PAINE CO 6 Westgate Rd Addison III (5)—
ADV PG 94

Palmer Electric & Mfg Co 24 Water St Wakefield
Mass (7)
Porcelain Products Co 224 N Patterson St Carey

Porcelain Products Co 224 N Patterson St Carey
Ohio (2)

POWER-STRUT DIV VAN HUFFEL PRODUCTS INC
Dietz Rd Warren Ohio (3-4-5)—ADV PG 93
Preformed Line Products Co 5349 St Clair Ave
Cleveland 3 Ohio (10)
Queen Products Co Inc Thirteenth & Rowan Sts
Louisville 3 Ky (7)
Ralco Mfg Co 123-141 N Albany Ave Chicago 12
III (3)
Red Seal Electric Co 10307 Detroit Ave Cleveland
2 Ohio (1)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa
(2)
Rome Cable Div of Alcoa (20 2015) Rome Cable Div of Alcoa 421 Ridge St Rome NY (10) NY (10) Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (5) Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1) Conn (5)
Spring City Electrical Mfg Co Spring City 85 Pa

(1)
STEEL CITY ELECTRIC CO 1207 Columbus Ave
Pittsburgh 33 Pa (1-2-3-4-5)—ADV PG 104
Superior Porcelain Co 931½ Market St Parkersburg W Va (2)
Superior Staple Mfg Co 40 Commercial St Fitchburg Mass (5)
TA Mfg Corp 4607 Alger St Los Angeles 39
Calif (1) FERSINEERING CO 1437 M Market

THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (5)—ADV PG 127 Thomas & Betts Co Inc 36 Butler St Elizabeth 1 NJ (9) Titchener (E H) & Co 67 Clinton St Binghamton NY (5) Unistrut Products Co 933 Washington Blvd Chicago 7 III (4) Electric Mfg Co Inc 20-34 W 11 St 2) Covington Ky (7) (Box 272)

#### 6H. MISC. CONDUCTORS

Busbar & supports, copper
 Crane rails
 Busbar & supports, aluminum

Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa (1)
Anderson Electric Corp P 0 Drawer 2151 Birmingham 1 Ala (1)
Burndy Corp Norwalk Conn (1)
Chase Brass & Copper Co Inc 236 Grand St Waterbury 20 Conn (1)
Dossert Mfg Corp 249-255 Huron St Brooklyn 22
RY (1)
Electric Materials Co Box 390 North East Pa (1)
Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (1)
General Electric Co Apparatus Sales Schenectady

General Electric Co Apparatus Sales Schenectady 5 NY 5 NY Leonard Electric Mfg Co 3907 Perkins Ave Cleveland 14 Ohio
Memco Engineering & Mfg Co Inc Commack LI
NY (1)

 NY (1)
 Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (1)—ADV PG 107
 Penn-Union Electric Corp 315 State St Erle Pa (1) Powercraft Corp 2215 De Kalb St St Louis 4 Mo Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (1-2) Revere Copper & Brass Inc 230 Park Ave NY 17 NY (1)

NY (1) Reynolds Metals Co Richmond 18 Va (3) Rome Cable Div of Alcaa 421 Ridge St Rome NY (1) Rusgreen Mfg Co 14262 Birwood Ave Detroit 38 Mich (1) Mint 11)
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC (1)
Young Electric & Mig Co Inc 2134 Curtis Derwer 2 Colo (1)

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

## Description, Pages Catalog No. & Mfr.

- 6-1 Reels; 46p; Cat. No. 25-A (Aero-Motive)
- Cable and Portable Cords; 23p; Cat. No. 72A (Carol) 6-2
- Communication Wire & Cable; 32p; Cat. No. 108 (Columbia Wire)
- 6-4 Wire and Cable; 24p; Cat. No. 3 (Ettco)
- Specifications for Quality Engineered Tele-phone Cables; 32p; Cat. No. T-5-60 (General Cable)
- Specifications for Telephone Cables; 21p; Cat. No. T-9-60 (General Cable)
- Transmission Properties of Polyethylene Insulated Cables at Voice and Carrier Frequencies; 23p; Cat. No. T-14-60 (Gen-eral Cable)
- Mineral Insulated Cable; 16p; Cat. No. S-2 (General Cable)
- Telephone Wire and Cable; 80p; Cat. No. T-3-60 (General Cable) 6.9
- 6-10 Flexible Cords & Cord Sets; 48p; Cat. No. SG-2-59 (General Cable)
- Wire and Cable; 15p; Cat. No. 1105B (Okonite) 6-11
- Potheads and Connectors; 58p (Rusgreen)
- 6-13 PVC Insulated Leads for Oil-Filled Transformers; 7p; Cat. No. RCT 320 (Rome)
- Corona-Level Measurements on Insulated Cable; 11p; Cat. No. RCT 711 (Rome) 6-14
- Metallic Sheathed Cable Systems; 12p (Simplex) 6-15
- 6-16 Connectors & Fittings; 32p (Weaver)
- Welding Cables and Jumpers; 20p; Cat. Sec. 5 (Rees)
- Application Experience with Cable Having Corrugated Metal Sheaths; 12p (Simplex) 6-18
- Metallic Sheathed Cable Systems; 12p 6-19

#### SECTION 7. RACEWAY AND FITTINGS

Raceway tools are listed in Section 12. Tray and troughs and other conductor supports are listed in Section 6.

#### 7A. AUXILIARY GUTTERS

For increasing size of cabinets and panels to provide additional wiring room.

Adam (Frank) Electric Co 3647 Windsor Pl St Adam (Frank) Electric Co 3-647 Windsor PI St.
Louis Mo
Alwalt Mfg Co Inc 1706 Lapham Dr (P 0 Box
1171) Modesto Calif
B & C Metal Stamping Co P 0 Box 2506 Atlanta
Ga
Burns (James F) Co 1601 Industrial Highway Pennsauken NJ Southern Countries Processing Pro

●HOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Min—ADV PG 102-118 ●KEYSTONE MFG CO 23328 Sherwood Rd Warren Mich—ADV PG 123

Mich—ADV PG 123
Leonard Electric Mfg Co 3907 Perkins Ave Cleveland 14 Ohio
Metropolitan Electric Mfg Co 2250 Steinway St
Long Island City 5 N Y
National Electric Div H K Porter Co Inc Porter
Bidg Pittsburgh 19 Pa
Parker Electrical Mfg Co 221 Washington St Gakland 7 Calif

Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky Square D Co Executive Plaza Park Ridge III Sun Electric Products Inc 28 S Day St Orange

Wadsworth Electric Mfg Co Inc 20-34 W 11th St

(Box 272) Covington Ky

WESTINCHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa—
ADV PG 2nd cover
Young Electric & Mfg Co Inc 2134 Curtls Denver 2
Colo Zinsco Electrical Products 729 Turner Los Angeles

Square D Co Executive Plaza Park Ridge III (1)
Unistrut Products Co 933 Washington Blvd Chicago 7 III (4)
Walker Brothers P D Box 33 Conshohocken Pa

Wheatland Electric Products Co 500 Logan St Carnegie Pa (1)

•WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gate-way Center (Box 448) Pittsburgh 30 Pa (5)— ADV PG 2nd Cover Wheatland Electric Products Co 500 Logan St

Carnegie Pa (1-5-9)

WIREMOLD CO Hartford 10 Conn (11)—ADV PG 4 gstown Sheet and Tube Co P 0 Box 900 bungstown 1 Ohio (5-10)

#### 78. BUSWAY

Low-impedance feeder
 Plug-in
 Current-limiting
 Trolley duct
 Excitation
 High frequency

Metal-enclosed busbars for exposed wiring installation. Trolley type incorporates bus or conductors accessible to sliding shoes or connectors for power feed.

Adam (Frank) Electric Co 3647 Windsor PI St Louis Mo (1-2) Calvert Co 19851 Ingersoll Dr Rocky River 16 Ohio (1) Ohio (1)
Continental Electric Equipment Co Box 1055 Cincinnati 1 Ohio (1-2)
Delta-Star Electric Div H K Porter Co Inc 2437
Fulton St Chicago 12 III (4)
Electric Distribution Products Inc 2200 31st St SW Allentown Pa (1-2)
Empire Switchboard Co Inc 810 Fourth Ave Brooklyn 32 N Y (1-2)

FEDERAL PACIFIC ELECTRIC CO 50 Paris St Newark 5 N J (2-3-4)—ADV PG 105
Feedrail Corp 125 Barclay St New York 7 NY (4)

(4)
General Electric Co
41 Woodford Ave Plainwille Conn (1-2-3-4)
GEBERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1 thru 4)—ADV PG Ave 84-85 isul-8-Corp 1369 Industrial Rd San Carlos Calif (1-2-4)

(1-2-4)

1-T-E Circuit Breaker Co BullDog Electric Products
Div 7610 Jos Campau Detrolt Mich (1-2-4)
Metropolitan Electric Mfg Co 2250 Steinway St
Long Island City 5 N Y (1-2-3)

NATIONAL ELECTRIC DIV H K PORTER CO INC
Porter Bldg Pittsburgh 19 Pa (1-2)—ADV
PG 97-98

Ringsdorff Pa (4) ff Carbon Corp Box 22 East McKeesport Square D Co Executive Plaza Park Ridge III (1-2-3)

(1-2-3)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (5)
Westinghouse Electric Corp Standard Control Div
Beaver Pa (1-2-3-5-6)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa
(1-2-3)—ADV PG 2nd cover
Young Electric & Mfg Co Inc 2134 Curtis Denver
2 Colo (1)
Zinsco Electrical Products 729 Turner Los Angeles
12 Calif (1-2)

#### 7C. CELLULAR FLOOR RACEWAY SYSTEMS

Metallic
 Non-metallic
 Concrete
 Complete adjustable floors

Systems which permit use of structural materials for enclosing electrical conductors.

Ceco Steel Products Corp 5601 W 26 St Chicago 50 [11 (1)]
Conduffor Corp 13560 Lorain Ave (P 0 8ox 2748)
Cleveland 11 Ohio (1-3)
General Electric Co Chemical & Metallurgical Div
Cloud Products Dept 980 Warren Ave Niles Conduit Ohio (1) Howard Electric Co 1950 Ruby St Melrose Park

NATIONAL ELECTRIC DIV H K PORTER CO INC Porter Bldg Pittsburgh 19 Pa (1)—ADV PG 97-98

#### 7D. CONDUIT & DUCT

Aluminum
 Asbestos-cement
 Clay
 Fiber
 Steel
 Steel, glastic-coated
 Wrought iron
 Soapstone
 Plastic
 Allay
 Il. Non-metallic (loom)
 Fiberglass

For protection of conductors between source and load. For accessories, see "Conduit Fit-tings" in index.

Aluminum Co of America 1501 Alcoa Bldg Pitts-burgh 19 Pa (1) American Hard Rubber Co Ace Rd Butler NJ (9) American Metal Moulding Co 146 Colt St Irving-ton NJ (6) Brown Co 150 Causeway St Boston Mass (4) Busada Mfg Corp 32-21 Downing St Flushing 54 NV (9) Byers Co Clark Bidg Pittsburgh 30 Pa (7 Carion Products Corp P 0 Box 133 Aurora (9) Chesflex Corp 684 Nepperhan Ave Yonkers NY (9) (9)
Clifton Conduit Co 3300 Eastbourne Ave Baltimore 24 Md (5)
Consolidated Pipe Co of America 1066 Home Ave Akron Ohio (9)
Crescent Plastics Inc 955 Diamond Ave Evansville 7 Ind (9)
Electric Hose & Rubber Co 12th & Dure Sts Wilmington Dela (9)
General Electric Co Chemical & Metallurgical Div Conduit Products Dept 980 Warren Ave Niles Ohio (5-6)

Ohio (5-6)

GRAYBAR ELECTRIC CO INC
NY 17 NY (5)—ADV PG 2

Industrial Plastic Fittings Co
Cleveland 11 Ohio (9)

Jasco Aluminum Products Div
Unexcelled Chemical
Corp 31 Nassau Terminal Rd New Hyde Park
NY (1) NY (1)

Johns-Marwille 22 E 40 St New York 16 NY (2)

Johns-Marwille 22 E 40 St New York 16 NY (2)

Kaiser Aluminum & Chemical Sales Inc Kaiser

Center 300 Lakeside Dr Oakland 12 Calif (1)

Kraloy/Chemtrol Co Electrical Conduit Div 402

W Central Ave Santa Ana Calif (9)

Kyova Fiber Pipe Co 1912 S First St Ironton

Ohio (4)

Laclede Steel Co Arcade Bldg St Louis 1 Mo (5)

Line Material Industries McGraw-Edison Co 700

W Michigan St Milwaukee Wis (4)

Mark (Clayton) & Co 1900 Dempster St Evanston

III (1-5)

Maryland Lava Co Box 127 Bel Air Md (8)

Maryland Lava Co Box 127 Bel Air Md (8)
Natco Corp 327 Fifth Ave Pittsburgh 22 Pa (3)
National Electric Div H K Porter Co Inc Porter
Blidg Pittsburgh 19 Pa (5)
National Supply Div Armco Steel Corp Two
Gateway Center (P O Box 416) Pittsburgh 30
Pa (5) Orangeburg Mfg Co 375 Park Ave New York 22 NY (4)

NY (4)
Perma-Pipe Corp P 0 Box 525 Middleboro Ky (9)
Pittsburgh Reflector Co Oliver Bidg Mellon
Square Pittsburgh 22 Pa (5)
Pittsburgh Standard Conduit Co James St Verona (1-5-6)

Pa (1-5-6)
Plastiline Inc. 1251 N E 48 St (P 0 Box 2023)
Pompano Beach Fla (9)
Republic Steel Corp Steel and Tubes Div 224 E
131 St Cleveland 8 Ohio (5-6)
Reynolds Metals Co Richmond 18 Va (1)
ROME CABLE DIV OF ALCOA 421 Ridge St Rome
NY (1-5-9)—ADV PG 42
Soapstone Duct Co 3985 Beach St Oakland Calif
(8) (8) Southwestern Plastic Pipe Co 5763-NQ Mineral

Wells Tex (9)
Stablin Bros Inc Belding Mich (12)
Steelduct Co Republic Steel Bidg Youngstown Onlo (5) Taylor Electric Inc 15400 Dale Detroit 23 Mich

TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (4-5)— FINANCIE CONDUIT & CABLE CU INC Triangle & Jersey Aves New Brunswick NJ (4-5)—
ADV PG 3rd Cover
United States Rubber Co Naugatuck Chemical Div 946K Elm St Naugatuck Conn (9)
Walker Brothers P O Box 33 Conshohocken Pa (1-5) Plastics Corp 1515 W Second St Hastings

#### 7E. CONDUIT & EMT FITTINGS

E. CONDUIT & EMT FITTINGS

1. Connectors
2. Bushings, couplings & locknuts
3. Bushing adapters
4. Bedie & covers
5. Bushing adapters
6. Pulling elbows & adapters
7. Expansion fittings
8. Gaskets
9. Hangers, straps, clamps & supports
10. Markers
11. Nipples \* running thread
12. Seals, sealing plugs & compound
12. Service entrance masts, heads & fittings
14. Thread guards
15. Conduit ventilators
16. Deflection fittings
17. Enlargers
18. Plastic fittings
19. Fiexible metallic conduit fittings
20. Aluminum fittings
21. Liquid-tight flexible conduit fittings
22. EMT fittings
23. Insulating bushings
24. Insulating bushings
25. Grounding bushings
26. Grounding bushings

Accessories used to join, seal or terminate conduit and electric metallic tubing. See also "Boxes" in index.

Acme Mfg & Gasket Co 738 N 41 St Phila 4 Pa (B)
Adalet Mfg Co 14300 Lorain Ave Cleveland 11 Ohio (2-7-9-12-13)

ALL-STEEL EQUIPMENT CO INC Aurora III (1-2-13)—ADV PG 117
Allen-Stevens Conduit Fittings Corp 33-35 62nd St Woodside 77 NY (1-2-3-7-11-13-19)
Alimetal Engineering Inc 1003 S Date Ave Alhambra Calif (9)
Appex Bolt Products Co 452-458 N Claremont Ave Chicago 12 III (9)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (1-2-3-4-9-11-12-13)
Arrolet Carp Foot of Bower St Montgomery Pa (2-3-4-8)
Associated Manufacturers & Distributors Corp 5015

(2-3-4-8)
Associated Manufacturers & Distributors Corp 5015
S E Haig St Portland 6 Ore (1-11)
Atlantic Conduit Fittings Corp 5015
Boston Mass (1-2-3-4-9-11-12-13-17)
Atlas Metal Industries 259 W 23 St Haleah Fla
(9)
Badger Die Casting Corp 201 W Oklahoma Ave
Milwaukee 7 Wis (1)

BLACKHAWK INDUSTRIES 250 S Main St
Dubuque Iowa (1-2-3-4-9-12-13)—ADV PG 88
Bowers Mfg Co Inc 6700 Avaton Blvd Los Angeles
3 Calif (9)
Brady (WH) Co 727 W Glendale Ave Milwaukee 9
Wis (10)
Bridgeport Fittings Inc. 209 Cartar St Baldon

Wis (10)
Bridgeport Fittings Inc 209 Center St Bridgeport
2 Conn (1 thru 6-8-9-13)
BRIEGEL METHOD TOOL CO 104 N E First St
Galva III (1-2)—ADV PG 100
Brown Company 150 Causeway St Boston 14
Mass (1-5-17)
Burbanan Finetrical Products Corp. 434 US Poute Brown Company 150 Causeway St Boston 14
Mass (1-5-17)
Buchanan Electrical Products Corp 434 US Route
22 Hilliside NJ (2)
Burndy Corp Norwalk Conn (1)
Clifton Conduit Co 3300 Eastbourne Ave Baltimore 24 Md (2-5-11)
Conduit Fittings Corp 6400 W 66th St Chicago
38 III (1-2-5-9-11-13)
Conduit Nipple Mfg Co 1455 Spring Garden Ave
Pittsburgh 12 Pa (2-5-11)
PCONDUIT PIPE PRODUCTS CO 157 W Fulton St
Columbus 16 Ohio (2-5-11-20)—ADV PG 96
Consolidated Pipe Co. of America 1066 Home
Ave Akron Ohio (18)
Crescert Plastics Inc. 955 Diamond Ave Evansville
7 Ind (18)
Crouse-Hinds Co Syracuse 1 NY (1 thru 9-12-13)
Diamond Expansion Bolt Co Inc Garwood NJ (9)
Dolco Mfg Co 2350 Curry St Long Beach 5
Calif (13)

Diamond Expansion Bolt Co Inc Garwood NJ (9)
Dolco Mfg Co 2350 Curry St Long Beach 5
Calif (13)
Duro Fittings Co 2210 S Davie Ave Los Angeles
22 Calif (1-2-4-5-9-11-12-13-19)
Earl Electric Mfg Corp 35-20 Borden Ave Long
Island City NY (1-2-9)

EFFICIENCY ELECTRIC & MFG CO Park Ave Ext
P 0 Box 30 East Palestine Ohio (9)—ADV
PG 120-122

Electric Tibe Schutet 70-14 Grand Ave Massath

Products 74-16 Grand Ave Maspeth NY (1-2-11) NY (1-2-11) Electrical Fittings Corp 37-50 57th St Woodside 77 NY (1-2-4-5-8-9-11-12-13-19-21) Electroline Mfg Co 2622 E 51st St Cleveland 4 Ohio (1-2) Elliott Electric Mfg Corp 50-30 98th St Corona 68 NY (1 thru 9-11-12-13-14) Elliott Electric Products Co 1513 Olmstead Ave New York 62 NY (1-9-11-12-13-14) Erico Products Inc 2070 E 61 Pl Cleveland 3 Ohio (9) Fastway Fasteners Inc 1676 E 28 St Lorain Ohio

FULLMAN MFG CO 1209-1215 Jefferson St La-trobe Pa (9)—ADV PG 128 Gateway Engineering Co 3233 W Grand Ave Chi-cago 51 III (9) Gateway Engineering
cago 51 III (9)
Gedney Electric Co Americas Bidg Radio City
NY 20 NY (1 thru 6-8-9-11-12-13-14)
GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1 thru 17)—ADV PG
BA-RS

B4-B5
General Steel Fittings Co 1321 21st St Racine
Wis (2-11)
Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif (1-2-5-9-11-12)
GRAYBAR ELECTRIC CO INC 420 Lexington
Ave NY 17 NY (1 thru 14)—ADV PG 2
Greene (R H) Inc 1201 24th St Oakland 7
Calif (2-9-12)
Grinnell Co Inc 260 W Exchange St California Grinnell (RI (9) Co Inc 260 W Exchange St Providence 2 Halex Die Casting Co 8640 Bessemer Cleveland 27 Ohio (1-2) lliam) Co Canal Bank Windsor Locks Conn (9)

Holub Industries Inc 442 Elm St Sycamore III
(9)

(9)

IDEAL INDUSTRIES INC 5136 Park Ave Sycamore III (5-6-13)—ADV PG 103

Johns-Manville 22 E 40 St New York 16 NY (12)

Jordan Industries Inc 3030 N W 75 St Miami 47

Fia (12-14) Fila (12-14)
Kaiser Aluminum & Chemical Sales Inc. Kaiser
Center 300 Lakeside Dr. Oakland 12 Calif (5)
Kees (F D) Mfg Co. 700 Park Ave. Beatrice. Neb

Control Ave Santa Ana Calif (18)

Control Ave Santa Ave

M & T Welding Products Corp 703 37th Ave Oakland Calif (13)

M & W ELECTRIC MFG CO INC 5 Walnut St (P O Box 87) East Palestine Ohio (1-9-12-13)—ADV PG 129 adison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (9).
arco Industries 207 S Helena St Anaheim Calif (2)

(2)
Mark (Clayton) & Co 1900 Dempster St Evanston
III (2-5)

MASON (I. E) CO 98 Business St (Hyde Park)
Boston 36 Mass (4-5-8-13)—ADV PG 121

MCCAFFREY MFG & SUPPLY CO 1840 W 14 St
Chicago 8 III (13)—ADV PG 122
McKinley (Ben P) Co 525 S Clinton St Chicago 7
III (22) Merwin Mfg Co 19th & German Sts

Metalectrics Inc 627 Greenwich St New York 14 NY (1 thru 5-9-11-12-13-17) Metro Casting Co Inc 47 Grattan St Brooklyn 37 NY (1-2)

Midwest Electric Mfg Co 1639 Walnut St Chicago 12 III (2-5-9-11-13)

12 III (2-5-9-11-13)

■MINERALLAC ELECTRIC CO 25 N Peoria St Chlcago 7 III (9-12)—ADV PG 108

■MISENER MFG CO INC 202-208 Walton St Syracuse 2 NY (12)—ADV PG 124 cuse 2 NY (12)—ADV PG 124 Mult-A-Frame Corp 6401 Epworth Blvd Detroit 10 Mich (9)

Myers Electric Products Inc 3019 S Vail Ave Los Angeles 22 Calif (1) National Electric Div H K Porter Co Inc Porter Bidg Pittsburgh 19 Pa (1-2-5)

National Supply Div Armco Steel Corp Two ( way Center (P 0 Box 416) Pittsburgh 30 Two Gateway (2-5)

0 Z ELECTRICAL MFG CO INC 262 Bond St Brooklyn 17 NY (2-7-12)—ADV PG 107 PLM Products Inc 3871 W 150 St Cleveland 11 Ohio (1-2-15)

PAINE CO 6 Westgate Rd Addison III (9)—ADV PG 94 Pipe Couplings Mfrs Inc P 0 Box 488 Martins Ferry Ohio (2-5-11)

sburgh Reflector Co Oliver Bldg Mellon Square Pittsburgh 22 Pa (9) Pittsburgh Standard Conduit Co James St Verona Pa (2-5-11-21)

Porcelain Products Co 224 N Patterson St Carey Ohio (13) Pyle-National Co 1344 N Kostner Ave Chicago 51 III (1-2-3-4-5-9-12-13)

Ramco Mfg Co 540 Westfield Ave W Roselle Park NJ (9)

Rattan Mfg Co 10 Wall St (P 0 Box 1745) Haven 7 Conn (1-2-5-9-11-13-22-23-24-25) Raybestos-Manhattan Inc 61 Willett St Passaic NJ (8) Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (2-12)
Republic Steel Corp Steel and Tubes Div 224 E 131 St Cleveland 8 Ohio (2-5)
Reynolds Metals Co Richmond 18 Va (2)
Richards (J. R) Co P O Box 482 Carnegie Pa (1-2-9-11-12-13) odale Mfg Co Inc 6th & Minor Sts Emmaus Pa G) Inc 159 Liberty Ave Mineola NY oller (Wm G) Inc 159 Elberg (1-2-11-12-13) (1-2-11-12-13) usgreen Mfg Co 14262 Birwood Ave Detroit 38 Rusgreen Mfg Co 14262 Birwood Nich (9)
Mich (9)
Russell & Stoll Co Inc 125 Barclay St NY 7 NY
(5-12)
Mfg Co 7606 N Clybourn Ave Sun Valley

Sloane Mfg Co 7606 N Clybourn Ave Sun Valley Calif (18)
So-Cal Electro Products Inc 4423 W Jefferson Blvd Los Angeles 16 Calif (1)
SPRING CITY ELECTRICAL MFG CO Spring City 85 Pa (2-7-16-18)—ADV PG 114-116
STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa (1-2-3-6-9-13)—ADV PG 104
Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (1 thru 6-8-9-1-11-21-31-7)
Steelduct Co Republic Steel Bldg Youngstown Ohio (2-5-11)
TA Mfg Corp 4607 Alger St Los Angeles 39 Calif (9)
Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (2-3-9-11-12-13)
THIEL TOOL & ENGINEERING CO 1417 N Market St St Louis 6 Mo (9)—ADV PG 127
Thompson Mfg Co 611 Stevens St Geneva III (9)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (1-2-19)
Union Insulating Co Inc Box 351 Parkersburg Va (2)

Union Insulating Co. Inc. Box 351 Parkersburg
W Va (2)
Unistrut Products Co. 933 Washington Blvd. Chicago
7 III (9)
Utility Service Co. Inc. 1620 13th St. (P. 0. Box
102) Racine Wis (13)
V Fitting Co. P. 0. Box 1253 Merchantville. NJ
(2-7-9-13)
Wither Sensibilities Inc. 775 Main St. New Pachalle.

(2-79-13)
Victor Specialties Inc 775 Main St New Rochelle
NY (9)
Wagner Malleable Products Co 222 W Adams St
Chicago 6 III (4)

Chicago 6 III (4)
Walker Brothers End St Conshohocken Pa (2-5)
WEAVER (J A) CO 2110 Howard St St Louis 6
Mo (1-2-5-9-13)—ADV PG 126
MESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway
Center (Box 448) Pittsburgh 30 Pa (1 thru 57 thru 14)—ADV PG 2nd cower
Wheatland Electric Products Co 500 Logan St
Carnegie Pa (18)
Yorkville Metal Products Co 627 Greenwich St
New York 14 NY (2-9-11-12-17)
Youngstown Sheet and Tube Co P 0 Box 900
Youngstown 1 Ohio (2-5)

#### 7F. ELECTRICAL METALLIC TUBING

Steel
 Steel, plastic coated
 Aluminum

## Lightweight conduit; frequently called "EMT" or "Thinwall."

Aluminum Co of America 1501 Alcoa Bidg Pitts-burgh 19 Pa (3)
Circle Wire & Cable Corp 5500 Maspeth Ave Maspeth NY (1)
Clifton Conduit Co 3300 Eastbourne Ave Baltimore
24 Md (1)
Columbia Cable & Electric Corp 255 Chestnut St
Brooklyn 8 NY (1)
General Electric Co Chemical & Metallurgical Div
Conduit Products Dept 980 Warren Ave Niles
Ohio (1-2)

Choult Products Dept 980 Warren Ave Niles
Ohio (1-2)

GENERAL ELECTRIC SUPPLY CO 1266 Boston Ave
Bridgeport Conn (1-2-3)—ADV P6 84-85
Laclede Steel Co Arcade Bidg St Louis 1 Mo (1)
Mark (Clayton) & Co 1900 Dempster St Evanston
III (1)

NATIONAL ELECTRIC DIV H K PORTER CO INC Porter Bidg Pittsburgh 19 Pa—ADV PG 97-98 National Supply Div Armco Steel Corp Two Gate-way Center (P 0 Box 416) Pittsburgh 30 Pa (1)

Nikoh Tube Co 5000 S Whipple St Chicago 32 Pittsburgh Standard Conduit Co James St Verona Pa (1)

Pa (1)
Republic Steel Corp Steel and Tubes Div 224 E
131 St Cleveland 8 Ohio (1-2)

ROME CABLE DIV OF ALCOA 421 Ridge St Rame
NY (1-3)—ADV PG 42
Steelduct Co Republic Steel Bldg Youngstown
Ohio (1)

Ohio (1)

TRIANGLE CONDUIT & CABLE CO INC Triangle & Jersey Aves New Brunswick NJ (1)—ADV PG 3rd cover
Walker Brothers P 0 Box 33 Conshohocken Pa (1)
Wheatland Electric Products Co 500 Logan St Carnegie Pa (1)
Youngstown Sheet and Tube Co P 0 Box 900 Youngstown 1 Ohio (1)

#### 7G. FLEXIBLE METALLIC CONDUIT

## Spirally wound steel strip, interlocked to pro-vide flexible enclosure for conductors.

American Flexible Conduit Co Inc. 969 Shawmut Ave New Bedford Mass (1-2)
American Metal Moulding Co 146 Coit St Irvington NJ (1-2)

ANACONDA METAL HOSE DIV ANACONDA AMERICAN BRASS CO P 0 Box 791 Waterbury 20 Conn (1-2)—ADV PG 1

Clifton Conduit Co 3300 Eastbourne Ave Baltimore 24 Md (1)

24 Md (1)
Columbia Cable & Electric Corp 255 Chestnut St
Brooklyn 8 NY (1-2)
Electri-Flex Co Roselle III (2)
Ettoc Wire & Cable Corp 75 Onderdonk Ave Brooklyn 37 NY (1)
Flexonics Corp 1430 S Third Ave Maywood III
(1-2)

Gedney Electric Co Americas Bidg Radio City NY 20 NY (1-2)

GRAYBAR ELECTRIC CO INC 420 Lexington Ave NY 17 NY-ADV PG 2
International Metal Hose Co Ashford Ave Bellevue Ohio (1-2)
Kopex Div Gemmer Mfg Co 6400 Mt Elliott Ave Detroit Mich (1)
Marco Industries 207 S Helena St Anaheim Calif (1)

NATIONAL ELECTRIC DIV. H M ADDITIONAL ELECTRIC DIV.

 NATIONAL ELECTRIC DIV H K PORTER CO INC Porter Bidg Pittsburgh 19 Pa—ADV PG 97-98 Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (1)

Metal Hose Co 2133 S Kedzie Ave Chi-

#### 7H. SURFACE RACEWAY

Non-metallic
 Non-metallic
 Ground wire moulding
 Combination raceway & fixture support
 Combination raceway & multi-outlet

system 6. Overfloor duct

For extension of existing concealed wiring, or for complete installation where concealed wiring is unnecessary or impractical.

Haley (R G) & Co Inc 767 Spitzer Toledo 4
Ohio (3)
Hendrix Wire & Cable Corp Milford NH (3)

KEVSTONE MFG CO 23328 Sherwood Rd Warren
Mich (1)—ADV PG 123
Mitchell Moulding Co 1501 Circle Ave Forest
Park III (3)

Park III (3)

NATIONAL ELECTRIC DIV H K PORTER CO INC.
Porter Bldg Pittsburgh 19 Pa (1-5)—ADV PG
97-98
Saylor Electric Products Corp 277 Pierce St Birmingham Mich (2)

saylor Electric Products Corp 277 Pierce St Birmingham Mich (2)

STEEL CITY ELECTRIC CO 1207 Columbus Ave Pittsburgh 33 Pa (1-4)—ADV PG 104 Versabar Corp 14 Whyte St Jersey City NJ (1) Wadsworth Electric Mfg Co Inc 20-34 W 11th St (Box 272) Covington Ky (1)

WIREMOLD CO Hartford 10 Conn (1-5-6)—ADV PG 4

## 7K. UNDERFLOOR DUCT AND DISTRIBUTION

For concealed passage of conductors be-neath floor. For structurally-integrated sys-tems, see "Cellular Floor Raceways."

Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa Gateway Engineering Co 3233 W Grand Ave Chicago 51 III General Electric Co Chemical & Metallurgical Div Conduit Products Dept 980 Warren Ave Niles

Howard Electric Co 1950 Ruby St Melrose Park

ONATIONAL ELECTRIC DIV H K PORTER CO INC
Porter Bidg Pittsburgh 19 Pa—ADV PG 97-98
National Supply Div Armoo Steel Corp Two Gateway Center (P 0 Box 416) Pittsburgh 30 Pa
Orangeburg Mfg Co 375 Park Ave New York 22
NY

Square D Co Executive Plaza Park Ridge III Walker Brothers P O Box 33 Conshohocken Pa Wheatland Electric Products Co 500 Logan St Carnegie Pa

#### 7L. WIREWAY

Covered troughs for continuous enclosure of

Alwalt Mfg Co Inc 1706 Lapham Dr (P 0 Box 1171) Modesto Calif B & C Metal Stamping Co P 0 Box 2506 Atlanta a mbia Metal Box Co 260 E 143 St NY 51 NY a Metal Products Co Box 408 Bridgeville Pa eral Pacific Electric Co 50 Paris St Newark 5

RJ RJ Roberts Co Distribution Assemblies Dept 41 Woodford Ave Plainville Conn General Metals Inc 858 Goldsboro Greensboro NC Gibbons Metal Products 730 Gibbons St Los

Gibbons Metal Products 730 Gibbons St Los Angeles 31 Calif MOFFMAN ENGINEERING CORP 1050 Tyler St Anoka Minn—ADV PG 102-118 MUENEFELD CO ENGINEERED PRODUCTS DIV 2701 Spring Grove Ave Cincinnati 25 Ohio—ADV PG 113

MEYSTONE MFG CO 23328 Sherwood Rd Warren Mich—ADV PG 123

Mecod Metal Box & Panel Mfg Co Inc 2522 W Huntington St Phila 32 Pa Metropolitan Electric Mfg Co 2250 Steinway St Long Island City 5 NY National Electric Div H K Porter Co Inc Porter Bidg Pittsburgh 19 Pa BD PW INDUSTRIES INC 11200 Rooseveit Bird Philadelphia 15 Pa—ADV PG 112 Power-Strut Div Van Huffel Products Inc Dietz Rd Warren Ohio

Queen Products Co Inc Thirteenth & Rowan Sts Louisville 3 Ky Square D Co Executive Plaza Park Ridge III Taylor Electric Inc 15400 Dale Detroit 23 Mich

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

Description, Pages Catalog No. & Mfr.

Aluminum Unilets; 16p; Cat. No. AL 60 (Appleton)

Headerduct System; 12p; Cat. No. 492 7-2 (Cope)

Underfloor Distribution System; 19p; Cat. 517 (Cope) 7-3

Wireways, Cabinets & Meter Sockets; 52p; Cat. No. 9 (Circle A-W)

7-5 Electrical Fittings; 58p; Cat. No. F960 (Electrical Fittings)

7-4 Plug-in Busway; 24p; Cat. No. GEA-6173

7-7 Lighting-type Busway; 12p; Cat. No. GEA-6170 (GE)

7-8 Plug-in Busway; 12p; Cat. No. GEA-6172E (GE)

Wireways and Enclosures; 15 p; Cat. No. 159-D (Keystone) 7.9

7-10 Conduit Supports; 28p (Minerallac)

Fittings & Lighting Equipment; 32p; Cat. No. 60 (Pyle-National)

7-12 Steel Conduit; 11p; Cat. No. RCP-9001

7-13 Headerduct; 8p (Wheatland)

Underfloor Duct: 12p (Wheatland)

7-15 Conduit: 8p (Wheatland)

Cast Aluminum Cond Schedule 5 (Mason) Conduit Fittings; 12p;

7-17 .Permanently PVC-Coated Rigid Conduit Sys-tems; 8p; Cat. No. PB-101 (Pittsburgh Standard)

#### SECTION 8. MOTORS AND GENERATORS

For flexible reference, motors are listed in four classifications: size, design, enclosure, and application.

#### BA. MOTORS-SIZE

Integral horsepower
 Fractional horsepower
 Sub-fractional (ministure)

Acro Switch Div Robertshaw-Fulton Controls Co 2040 E Main St Columbus 16 Ohio (3) Alliance Mrg Co Inc Lake Park Blvd Alliance Ohio (3) Allis (Louis) Co 427 East Stewart St Milwaukee I Wis (1)

1 WIS (1)

ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee 1 Wis (1)—ADV PG 74-75

American Electronics Inc 655 West Washington
Blvd Los Angeles 15 Calif (2-3)

Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2) Bar -Colman Co P O Drawer 99 Rockford III Bodine Electric Co 2500 W Bradley Pl Chicago 18

III (2-3)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (1-2)
Bristol Motor Div Vocaline Co of America Inc
Coulter St Old Saybrook Conn (3)
Brook Motor Corp 3302-4 W Peterson Ave Chicago 45 III (1-2)
Carter Motor Co 2711 W George St Chicago 18

111 (2) Century Elec Mo (1-2) Electric Co 18th & Pine Sts St Louis 3

Mo (1-2)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (1)
Cloveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio (1-2)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1)
Cramer Controls Corp Main St Centerbrook Conn (3)

Cyclo-Freez Corp 6318 Cambridge Minneapolis 16 Minn (2) tor Co 1375 Clay St Santa Clara Calif Da (2-3)

(2-3)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 III (1-2)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (1-2-3)
Oumore Co 1300 17th St Racine Wis (2)

Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 III (2-3) Electra Motors Inc 1110 N Lemon St Anaheim Calif (1-2) Electric Indicator Co Inc Camp Ave Springdale Conn (2-3)

Conn (2-3)

Electric Machinery Mfg Co 800 Central Ave Minneapolis 33 Minn (1)

Electric Motors & Socialities Inc King & Hamsher Sts Garrett Ind (2)

Electro Dynamic Div General Dynamics Corp 163 Ave & Bayonne NJ (1-2)

Elliott Co Jeannette Pa (1)

Emerson Electric Mfg Co 8100 Florissamt Ave St Louis 36 Mo (1-2)

Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III (1-2)

Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (2) Henderson Freeport III (1-2)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (2)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (1-2)

Ind (1-2)
General Electric Co Apparatus Saies Schenectady
5 NY (1-2-3)

GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1-2-3)—ADV PG 84-85
Gleason-Avery Inc 45 Aurelius Ave Auburn NY Globe Industries Inc 1784 Stanley Ave Dayton 4

Globe Industries Inc 1784 Stanley Ave Dayton 4 Ohio (2-3)
Hansen Mfg Co Inc RR #1 Princeton Ind (3)
Hansen Mfg Co Inc RR #0 W National Ave MilWaukee 46 Wis (1)
Haydon (A W) Co 232 N Elm St Waterbury
Com (3)
Haydon Div General Time Corp 245 E Elm St
Torrington Conn (3)
Heinze Electric Co 685 Lawrence St Lowell Mass
(3)
Hertner Electric Co 12690 Elmwood Ave Cleve-

(3)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1-2-3)
Holtzer-Cabot Div National Pneumatic Co Inc 125
Amory St Boston 19 Mass (2-3)
Howard Industries Inc 1760 State St Racine Wis (2-3)

Nowell Electric Motors Co 409 N Roosevelt Howell Mich (1-2)
IMC Magnetics Corp 570 Main St Westbury NY (2-3) Ideal Electric and Mfg Co East First St Mans-field Ohio (1) Imperial Electric Co 84 Ira Ave Akron 9 Ohio (1-2)

(1-2)
International Register Co 2620 W Washington Blvd Chicago 12 III (2)
Jack & Heintz Div Siegler Corp P 0 Box 6719 Cleveland 1 0hio (1-2)
Janette Electric Mfg Co Lehigh at Main Sts Morton Grove III (1-2-3)
Kingston Conley Inc Plainfield NJ (1-2)
Kurz & Root Sales & Engineering Corp 232 East North Island St Appieton Wis (1)
Leiand Electric Co 1501 Webster St Dayron 1
Ohio (1-2)

Lewus Electric Co 1254 W Harrison St Chicago 7 III (1-2) Lima Electric Motor Co Inc Findlay Road Lima Ohio (1-2)

Unio (1-2)
Marathon Electric Mfg Corp Wausau Wisc (1-2)
Marble Electric Corp Gladstone Mich (1)
Master Electric Div Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland Ohio (1-2)

McMillan Mfg Co 310 Broadway St Paul 1 Minn (2) (2)
Motor Specialty Inc 2801-17 Lathrop Ave
Racine Wis (2)
Motoresearch Co 1600 Junction Ave Racine Wis
(1-2-3)

(1-2-3) Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ (1-2) Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (1-2) Peerless Electric Div H K Porter Co Inc 1401 W Market 5t Warren Ohio (1-2) Rae Motor Corp Box 518 McHenry III (2-3) Redmond Co Inc 201 Monroe St Owosso Mich (2)

Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1-2) Reuland Electric Co 3001 W Mission Rd Alham-bra Calif (1-2)

Reynolds Electric Co 3000 River Rd River Grove III (2)
Robbins & Myers Inc 1345 Lagonda Ave Spring-field Ohio (1-2-3)
Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn (1)
Sangamo Electric Co 11th & Converse Springfield III (3)

Shelby Electric Inc East US Highway #421 Shel-byville Ind (1-2) Small Motors Inc 2076 Elston Ave Chicago 14 III (2-3)

Standard Electric Div Standard Dayton Corp P 0 Box 1001 Dayton 1 Ohio (1-2) Sterling Electric Motors Inc 5401 Telegroph Rd Los Angeles 22 Calif (1-2) System Analyzer Corp 700 W State St Nokomis

Thermador Electrical Mfg Co 5119 District Blvd Los Angeles 22 Calif (2) United Electric Machinery Co 8545 W 64 Pl Arvada Colo (1-2)

Arvada Colo (1-2)
U S Electrical Motors Inc 200 E Slauson Ave
Los Angeles 54 Calif (1-2) Electric Co 300 E Main St Owosso Mich (2-3)

UPPCO 900 S Desplaines St Chicago 7 III (2)
Wagner Electric Corp 6400 Plymouth Ave St
Louis 33 Mo (1-2) Louis 33 Mo (1-2)
Western Gear Corp Electro Products Div 132 W
Colorado St Pasadena 1 Calif (2-3) Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-2)

•WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gate-way Center (Box 448) Pittsburgh 30 Pa (1-2) ADV PG 2nd cover

#### 8B. MOTORS-DESIGN

Direct current
Polyphase induction
Polyphase synchronous
Single phase
High frequency
Wound rotor

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1 thru 4) \*\*ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee 1 Wis (1-2-3)—ADV PG 74-75 \*\*American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1 thru 4) Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2-4) Co P O Drawer 99 Rectford III

-Colman Co P O Drawer 99 Rockford III (1-4) Bodine Electric Co 2500 W Bradley Pl Chicago 18

Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (1-2-4)
Brook Motor Corp 3302-4 W Peterson Ave Chicago 45 III (4)
Mo (1-2-4)
Chandwscan Electric Co 18th & Pine Sts St Louis 3
Chandwscan Electric Co

Century Electric Co 18th & Pine Sts St Louis 3 Mo (12-2)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (12-23)
Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 phio (2)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (3)
Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif (5)
Continental Electric Co Inc 325 Ferry St Newark 5 NJ (12-23)
Cyclo-Freez Corp 6318 Cambridge Minneapolis 16 Minn (4)
Dalmotor Co 1375 Clay St Santa Clara Calif (1-4)
Dayton Electric Mfg Co 126 S Oakley Blvd Chi-

(1.4)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 III (2-4)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (1 thru 4)
Dumore Co 1300 17th St Racine Wis (4)
Elicor Div F L Jacobs Co 4235 W North Ave
Chicago 39 III (1.4)
Electra Motors Inc 1110 N Lemon St Anaheim
Calif (2-3-4)
Electric Indicator Co Inc. Camp Ave Springdale

Electric Motors Inc 1110 N Lemon St Anaheim Calif (2-3-4)
Electric Indicator Co Inc Camp Ave Springdale Conn (1 Intru 4)
Electric Machinery Mfg Co 800 Central Ave Minneagolis 13 Minn (2-3)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (4)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (1-2-3)
Electric Specialty Co 211 South St Stamford Conn (1)
Electric Oynamic Div General Dynamics Corp 163
Ave A Bayonne NJ (1-2)
Elliott Co Jeannette Pa (1-2-3)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 36 Mo (4)
Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III (1-2-3-4)
Fasco Industries Inc Davis & Toppin Sts Rochester 2 NY (4)
Franklin Electric Co Inc 400 E Spring St Bluffton Ind (1-2-4)
General Electric Co Apparatus Sales Schenectady

real Electric Co Apparatus Sales Schenectady
NY (1 thru 4)
son-Avery Inc 45 Aurelius Ave Auburn NV

(4)
Globe Industries Inc 1784 Stanley Ave Dayton 4
Ohio (1 thru 5)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1 thru 4)—ADV PG 2
Haft & Sons Inc 950 Kent Ave Brooklyn 5 NY Hansen Mfg Co Inc RR #1 Princeton Ind (1-4) Haydon (A W) Co 232 N Elm St Waterbury Conn (1-4) Heinze Electric Co 685 Lawrence St Lowell Mass (1-4) (1.4)
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio (1.2-4)
Holtzer-Cabot Div National Pneumatic Co Inc 125
Amory St Boston 19 Mass (1 thru 4)
Howard Industries Inc 1760 State St Racine Wis
(1 thru 4)
Howell Electric Motors Co 409 N Roosevelt Howell

(1 thru 4)

Howell Electric Motors Co 409 N Roosevelt Howell

Mich (2-4)

IMC Magnetics Corp 570 Main St Westbury NY

(1) Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2-3) Siegler Corp P 0 Box 6719 Cleveland 1 Ohio (2-4) Kingston Conley Inc Plainfield NJ (2-4) Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis (1 thru 4)

Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-2-4) PMUS Electric Co 1254 W Harrison St Chicago 7 III (4) Lev III (4)
Lima Electric Motor Co Inc Findlay Road Lima
Ohio (2-4)
Lincoln Electric Co 22801 St Clair Ave Cleveland
17 Ohio (2)
Marathon Electric Mfg Corp Wausau Wisc (1
thru 4)
Marble Electric County Marble Electric Corp Gladstone Mich (1-2)
Master Electric Div Reliance Electric & Engineering
Co 24701 Euclid Ave Cleveland Ohio (1 thru 4)
McMillan Mfg Co 310 Broadway St Paul 1 Minn (4) Mot otoresearch Co 1600 Junction Ave Racine Wis

(2-4)
Newman Electric Motors Inc 357 Wilson Ave
Newark 5 NJ (2-3-4)
Northwestern Electric Co 1750 N Springfield Ave
Chicago 47 III (1-2-4)
Peerless Electric Div H K Porter Co Inc 1401 W
Market St Warren Ohio (1-2-3-4)
Ree Motor Corp Box 518 McHenry III (1)
Redmond Co Inc 201 Monroe St Owosso Mich (1)
Redmond Co Inc 201 Monroe St Owosso Mich (1)
Reliance Electric & Engineering Co 24701 Euclid
Ave Cleveland 17 Ohio (1-2)
Reuland Electric Co 3000 W Mission Rd Alhambra
Calif (2-3-4)
Revnolds Electric Co 3000 River Rd River Grove
Revnolds Electric Co 3000 River Rd River Grove

Reynolds Electric Co 3000 River Rd River Grove 111 (2-4)

III (2-4)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4)
Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn (1-2)
Shelby Electric Inc East US Highway #421
Shelbyville Ind (2-3-4)
Small Motors Inc 2076 Elston Ave Chicago 14
III (1-4)
Standard Electric Inc

III (1-4)
Standard Electric Div Standard Dayton Corp P O
Box 1001 Dayton 1 Ohio (2-4)
Sterling Electric Motors Inc. 5-601 Telegraph Rd
Los Angeles 22 Calif (2-3-4)
Superior Electric Co a3 Laurel St Bristol Conn
(4)

(4)
System Analyzer Corp 700 W State St Nokomis III (2-4)
Technical Electronics Co 4060 Ince Blvd Culver City Calif (4)
United Electric Machinery Co 8545 W 64 PI Arvada Colo (4)
United Electric Motor Co 178 Centre St NY 13 NY (3)

NY 1.37 U S Electrical Motors Inc 200 E Slauson Ave Los Angeles 54 Calif (2) Universal Electric Co 300 E Main St. Owosso Mich (1-4)

Wagner Electric Corp 6400 Plymouth Ave St Louis 33 Mo (2-3-4) 33 Mo (2-3-4)
Western Gear Corp Electro Products Div 132 W
Colorado St Pasadena 1 Calif (1 thru 4)
Westinghouse Electric Corp Po Box 2278 Pittsburgh 30 Pa (1-2-3-4)
WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-23-4)—ADV PG 200 Courer

Center (Box 448) | —ADV PG 2nd Cover

#### 8C. MOTORS-ENCLOSURE

Drip-proof
Explosion-proof
Splash-proof
Weatherproof
Hermetic

Alliance Mfg Co Inc Lake Park Blvd Alliance Ohio (4)
Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1 thru 7)

ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee 1 Wis (1-2-3-4-7)—ADV PG 74-75
Baldor Electric Co 4353 Duncan Ave St Louis 10 Mo (1-2-3-4-7) odine Electric Co 2500 W Bradley Pl Chicago 18 Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2-3-4-6-7) Brook Motor Corp 3302-4 W Peterson Ave Chicago 45 III (1-3-4-7) 95 111 (1-3-4-7) Century Electric Co 18th & Pine Sts St Louis 3 Mo (1-2-3-4-5-6-7) Mo (1-2-3-4-3-0-7) Chandeyson Electric Co 4084 Bingham Ave St Louis 16 Mo (1-3-4) Continental Electric Co Inc 325 Ferry St Newark 5 NJ (1-2-3-7) S NJ (1-2-3-7)

Cyclo-Freez Corp 6-318 Cambridge Minneapolis 16
Minn (1-7)
Dalmotor Co 1375 Clay St Santa Clara Calif (7)
Dayton Electric Mfg Co 126 S Oakiey Blvd Chicago 12 III (1-2-3-7)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (1-2-5-7)
Elcor Div F L Jacobs Co 4235 W North Ave
Chicago 39 III (1-2-3-4-7)
Electra Motors Inc 1110 N Lemon St Anaheim
Calif (1-2-3-4-7) Electric Indicator Co Inc Camp Ave Springdale Conn (1-3-4-6-7) [1-2-4-6-7] [1-

(4)
Herther Electric Co 12690 Elmwood Ave Cleveland
11 Ohio (1)
Holtzer-Cabot Div National Pneumatic Co Inc 125
Amory St Boston 19 Mass (7)
Howard Industries Inc 1760 State St Racine Wis
(7)

ell Electric Motors Co 409 N Roosevelt Howell ich (1-2-3-4-7)

Howell Electric Motors Co 409 N Roosevelt Howell Mich (1-2-3-4-7)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2-3-4-5-7)
Jack & Heintz Div Siegler Corp P 0 Box 6719
Cleveland 1 Ohio (1-2-3-6-7)
Kingston Conley Inc Plainfield NJ (1-7)
Kingston Conley Inc Plainfield NJ (1-7)
Kurz & Root Sales & Engineering Corp 232 East
North Island St Appleton Wis (1-3-7)
Leiand Electric Co 1501 Webster St Dayton 1
Ohio (1-2-6-7)
Lima Electric Motor Co Inc. Elimiday Boad Lima Uma Electric Motor Co Inc Findlay Road Lima Ohio (1-2-4-7) Marathon Electric Mfg Corp Wausau Wis (1-2-3-4-7)

Marble Electric Corp Gladstone Mich (2-3-4-7)
Master Electric Div Reliance Electric & Engineering
Co 24701 Euclid Ave Cleveland Ohio (1 thru
4-7) McMillan Mfg Co 310 Broadway St Paul 1 Minn (4-7)

otoresearch Co 1600 Junction Ave Racine Wis (1-7) Mot (1-7)
Newman Electric Motors Inc 357 Wilson Ave Newark 5 NJ (1-2-3-4-7)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (1-3-7)
Peerless Electric Div H K Porter Co Inc 1401
W Market St Warren Ohio (1-2-3-4-6-7)
Rae Motor Corp Box 518 McHenry III (7)
Redmond Co Inc 201 Monroe St Owosso Mich (1-3-7)

Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1 thru 7) Reuland Electric Co 3001 W Mission Rd Alhambra Calif (1-3-4-7)

Reuland Electric Co 3001 W Mission Rd Alhamora Calif (1-3-4-7)
Reymolds Electric Co 3000 River Rd River Grove III (1-3)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4-7)
Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn (1-2-3-4-7)
Shelby Electric Inc East US Highway #421 Shelbyville Ind (1-3-7)
Small Motors Inc 2076 Elston Ave Chicago 14
III (1-3-4-7)
Standard Electric Div Standard Dayton Corp P O Box 1001 Dayton 1 Ohio (1-3-4-7)
Sterling Electric Motors Inc 3401 Telegraph Rd Los Angeles 22 Calif (1-2-3-4-7)
Siperior Electric Go 30 Laurel St Bristol Conn (2)

System Analyzer Corp 700 W State St Nokomis III (1-4-7)

III (1-4-7)
United Electric Machinery Co 8545 W 64 Pl
Arvada Colo (1 thru 4)
U S Electrical Motors Inc 200 E Slauson Ave Los
Angeles 54 Calif (1-2-3-4-7)
Universal Electric Co 300 E Main St Owosso
Mich (1-3-7)
Wagner Electric Corp 6400 Plymouth Ave St Louis
33 Mo (1 thru 7)
Western Gear Corp Electro Products Div 132 W
Colorado St Pasadena 1 Calif (1 thru 7)
Westinghous Electric Corp P 0 Box 2278 Plttsburgh 30 Pa (1 thru 7)

#### 8D. MOTORS-APPLICATION

1. Brake
2. Gear
3. Aircraft
4. Automotiv
5. Railway
6. Mining
7. Marine
8. Timing
9. Oil burner
10. Elevator

11. Pump
12. Crane & hoist
13. Power tool
14. Sewing machine
15. Instrument
16. Fan
17. Agitator drive
18. Stepping
19. Textile
20. Cranking
21. Vertical
22. Press
23. Sanitary

Adams Engineering Co 31711 Solon Rd Solon Ohio (2) liance Mfg Co Inc Lake Park Blvd Alliance Ohio (8-11-16) Al

(8-11-16)
Allis (Louis) Co 427 E Stewart St Milwaukee 1
Wis (1-2-10-11-12-13-16)

◆ALLIS-CHALMERS MFG CO 930 S 70th St Milwaukee 1
Wis (2-7)—ADV PG 74-75
American Electronics Inc 655 West Washington
Blvd Los Angeles 15 Calif (1-2-3-15-16)
Atlas Tool and Mfg Co 5147 Natural Bridge Ave
St Louis 15 Mo (2)
Baldor Electric Co 4355 Duncan Ave St Louis 10
Mo (7)

Barber-Coliman Co P O Decret 90 Control 10 arber-Colman Co P O Drawer 99 Rockford III (2-3-15-16) ernina Sewing Machine Co 29 W 35 St NY 1 NY (14) odine Electric Co 2500 W Bradley Pl Chicago 18

III (8-11-13-14-15)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (3-5-7-11)
Fristol Motor Div Vocaline Co of America Inc
Coulter St Old Saybrook Conn (8)
Brook Motor Corp 3302-4 W Peterson Ave Chicago
45 III (10-11-12)

Gratture Electric Co. 18th & Pine Sts. St Louis 3 Century Electric Co 18th & Pine Sts St Louis 3 Mo (1-2-7) mo (1-2-1) Cleveland Electric Motor Co 5213 Chester Ave Cleveland 3 Ohio (1-10-11-12-16) Continental Electric Co Inc 325 Ferry St Newark 5 NJ (10-11-12) Crank (8) Controls Corp Main St Centerbrook Conn

(8)
Cyclo-Freez Corp 6318 Cambridge Minneapolis 16
Minn (9-11-16)
Dalmotor Co 1375 Clay St Santa Clara Calif
(1-2-3-8-16)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (1 thru 7-9-10-16)
Dumore Co 1300 17th St Racine Wis (2)
Elicor Div F L Jacobs Co 4235 W North Ave
Chicago 39 III (1-3-5-6-7-11-15-16)
Electra Motors Inc 1310 N Lemon St Anaheim

Electra Motors Inc 1110 N Lemon St Anaheim Calif (1-2-10-11-12-13-16) Electric Indicator Co Inc Camp Ave Springdale Conn (1-2-3-5-6-7-8-11-13-15-16) Conn (1-2-3-5-6-7-8-11-13-15-16)
Electric Machinery Mfg Co 800 Central Ave Minneapolis 13 Minn (6-11-16)
Electric Motors & Specialties Inc King & Hamsher Sts Garrett Ind (16)
Electric Specialty Co 211 South St Stamford Conn (1-3)
Electrical Mfg Co 211 South St Stamford Electric Stamford Conn (1-3)

Conn (1-3)

Electrical Mfg Co 425 Lake Ave Racine Wis (14)

Electro Dynamic Div General Dynamics Corp 163

Ave A Bayonne NJ (1 thru 15)

Elviot Co Jeannette Pa (2-9-11-12-16)

Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III (1-2-5-6-7-9-10-11-12-16)

Falk Corp Box 492 Milwaukee 1 Wis (2)

Fasco Industries Inc Davis & Topin Sts Rochester 2 NY (9-11-16)

Franklin Electric Co Inc 400 E Spring St Bluffton Ind (2-11-12-13-16)

General Electric Co Apparatus Sales Schenectady 5

General Electric Co Apparatus Sales Schenectady 5 NY (1-2-4-thru 7-9 thru 16) Gleason-Avery Inc 45 Aurelius Ave Auburn NY

(2-8-15) (2-8-15)
Globe Industries Inc 1784 Stanley Ave Dayton 4
Ohio (1-2-3-4-6-7-8-11-13 thru 17)
Hansen Mfg Co Inc RR #1 Princeton Ind (8-15)
Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (12)
Haydon (A W) Co 232 N Elm St Waterbury Conn
(8-15)

Heinze Electric Co 685 Lawrence St Lowell Mass (2-4-14-16)

Molitzer-Cabot Diw National Pneumatic Co Inc 125 Amory St Boston 19 Mass (2-8-15) Howard Industries Inc 1760 State St Racine Wis (2-3-4-5-8-13-14-15-16) owell Electric Motors Co 409 N Roosevelt Howell Mich (1-2-10-11-12)

Electric and Mfg Co East First St Mans-d Ohio (6-7-11-12-16) International Register Co 2620 W Washington Blvd Chicago 12 III (8)

Jack & Heintz Inc 17600 Broadway Cleveland 1 Ohio (11-12-13-14) Janette Electric Mfg Co Lehigh at Main Sts Morton Grove 111 (2)

Kingston Conley Inc. Plainfield NJ (11-12-13-16) Kurz & Root Sales & Engineering Corp. 232 E North Island St. Appleton Wis (10) Inc 123 Webster St Dayton 2 Ohio (18)
-Neville Co 1374 E 51 St Cleveland 3 Ohio Ledex Inc Leece-

Leland Electric Co 1501 Webster St Dayton 1 Ohio (1-11-12-13) Lima Electric Motor Co Inc Findlay Road Lima Ohio (1-2-11-13-16) Marathon Electric Mfg Corp Wausau Wis (6-7-9-11-13-16) Marbie Electric Corp Giadstone Mich (1-2-6-7-11-12-16)
Master Electric Div Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland Ohio (1-2-7-10-11-12-13-16) cMillan Mfg Co 310 Broadway St Paul 1 Minn (2-8-9-11-15-16-17) (2-0-911-13-16-17)
inneapolis-Honeywell Regulator Co Industrial Div
Wayne & Windrim Aves Phila 44 Pa (15)
orse Chain Co Borg Warner Corp Ithaca NY
(21) Min Mo (2) Motor Specialty Inc 2801-17 Lathrop Ave Racine
Wis (13-14)
Motoresearch Co 1600 Junction Ave Racine Wis
(2-3)

(2-3)
Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (2-3-5-6-7-10-11-12-16)
Peerless Electric Div H K Porter Co Inc 1401
W Market St. Warren Ohio (1-6-7-10-11-12-13-16)
Rae Motor Corp Box 518 McHenry III (1-2-14)
Redmond Co Inc 201 Monroe St Owosso Mich
(7-9-11-13-16) Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio (1-2-6-7-10-11-12-13-16-22-23)

AUTOCO 3001 W Mission Rd Alhambra Calif (1-2-9-10-11-12-16)
synolds Electric Co 3000 River Rd River Grove
111 (16)

bra Calif (1-2-9-10-11-12-10)
Reynolds Electric Co 3000 River Rd River Grove
III (16)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (9 thru 13-16)
Safety Electrica Equipment Corp 1187 Dixwell Ave
New Haven Conn (1-5-7-11-12)
Sangamo Electric Co 11th & Converse Springfield
III (8)
Shelby Electric Inc East US Highway #421 Shel-

Shelby Electric Inc East US Highway #421 Shelbyville Ind (1-2-11-12-13-16-17) nall Motors Inc 2076 Elston Ave Chicago 14 rd Electric Div Standard Dayton Corp.
Box 1001 Dayton 1 Ohio (1-2-10-11-Standa

12-13) 12-13)
Sterling Electric Motors Inc 5401 Telegraph Rd
Los Angeles 22 Calif (1-2)
United Electric Machinery Co 8545 W 64 Pl
Mitted Colo (1-2)
U S Electrical Motors Inc 200 E Slauson Ave
Los Angeles 54 Calif (2-3-10-11-16)
Universal Electric Co 300 E Main St Owosso
Mich (9-11-16)

Western Gear Corp Electro Products Div 132 W Colorado St. Pasadena 1 Calif (1-2-3-8-11-15-16) estinghouse Electric Corp P 0 Box 2278 burgh 30 Pa (1 thru 7-9 thru 13-16-17)

Georator Corp Manassas Va (1-2)
Globe Industries Inc 1784 Stanley Ave Dayton 4
Ohio (1-2-5)
Hertner Electric Co 12690 Elmwood Ave CleveIand 11 Ohio (1-2)
Holtzer-Cabot Div National
125 Amory St Boston 19 Mass (1-2)
Homelite Div Textron Inc 67 Riverdale Ave
Port Chester NY (1-2)
Ideal Electric and Mfg Co East First St Mansfield Ohio (1-2)
Kato Engineering Co 1442 First Ave Mankato

ineering Co 1442 First Ave Mankato

field Ohio (1-2)

Kato Engineering Co 1442 First Ave Mankato
Minn (1)

Katolight Corp First Ave at Chestnut (P 0

Box 891) Mankato Minn (3)

Kurz & Root Sales & Engineering Corp 232 East

North Island St Appleton Wis (1-2)

Leece-Neville Co 1374 E 51 St Cleveland 3

Ohio (1-2)

Leland Electric Co 1501 Webster St Dayton 1

Ohio (1-2)

Marathon Fietric Mfg Corp Wausau Wis (1-2)

Ohio (1-2)
Marthon Electric Mfg Corp Wausau Wis (1-2)
Marble Electric Corp Gladstone Mich (1-2)
Master Electric Div Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland Ohio (1-2)

neering Co 24701 Euclid Ave Cleveland Ohio 1-27

Motoresearch Co 1600 Junction Ave Racine Wis (1-2)

Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (1-2)

Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (1-2)

Northwestern Electric Co 1750 N Springfield Ave Chicago 14 III (1-2)

Northwestern Electric Co 1750 N Springfield III (2)

Windraket St Warren Ohio (2)

Rew Motor Corp Box 518 McHenry III (2)

Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1)

Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn (1-2-3)

Sangamo Electric Co 11th & Converse Springfield III (2)

Small Motors Inc 2076 Elston Ave Chicago 14 III (1-2)

U S Electric Motor Co Cadiz Ohio (4)

Western Gear Corp Electro Products Div 132 W Colorado St Pasadena 1 Calif (1-2)

Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-2)

Wincharger Corp E Seventh & Division St Sioux City 2 Iowa (1-2)

Winpower Mfg Co Newton Iowa (1-2)

#### BE. GENERATORS

Alternating current
 Direct current
 High frequency
 Magnet

For changing mechanical energy to electrical energy; often called "dynamos" or "alternators."

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (1-2) Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-2) American Electronics Inc 655 West Washington Blvd Los Angeles 15 Calif (1) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (1-2) Century Electric Co 1806 Pine St St Louis 3 Mo (1-2) Mo (1-2)
Chandeyson Electric Co 4084 Bingham Ave St
Louis 16 Mo (1-2)
Columbia Electric Mfg Co 4519 Hamilton Ave
Cleveland 14 Ohio (1-2)
Continental Electric Co Inc 325 Ferry St Newark Cleveland 14 Ohio (1-2)
Continental Electric Co Inc 325 Ferry St Newark
5 NJ (1-2)
D & R Ltd 402 E Gutierrez St P 0 Box 1500
Santa Barbara Calif (1)
Dalmotor Co 1375 Clay St Santa Clara Calif
(1-2)
Palco Products Dix Gaperal Motors Corp. 329 E Dalmotor Co 1375 Clay St Santa Clara Calif (1-2)
Delco Products Div General Motors Corp 329 E
1st St Dayton 1 Ohio (1-2)
Eicor Div F L Jacobs Co 4235 W North Ave
Chicago 39 III (1-2)
Electric Indicator Co Inc Camp Ave Springdale
Conn (1-2)
Electric Indicator Co Inc Camp Ave Springdale
Conn (1-2)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (1-2)
Electric Specialty Co 211 South St Stamford
Conn (1-2-3)
Electro Specialty Co 211 South St Stamford
Conn (1-2-3)
Electro Dynamic Div General Dynamics Corp 163
Ave A Bayonne NJ (2)
Eliliott Co Jeannette Pa (1-2)
Fairbanks Morse & Co Electrical Div 303 N
Henderson Freeport III (1-2)
Fidelity Electric Co Inc 332 N Arch St Lancaster Pa (1)
General Electric Co Apparatus Sales Schenectady
5 NY (1-2)

#### **8F. POWER GENERATING SETS**

Steam engine powered
 Steam turbine powered
 Steam turbine powered
 Gasoline engine powered
 Gasoline engine powered
 Gas turbine powered
 Mercury turbine powered
 Mercury turbine powered
 Motor-driven (M-G sets)

## Engine-driven generating plants for provid-ing electricity for power or lighting.

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis (8) Allis-Chaimers Mfg Co 930 S 70th St Milwaukee 1 Wis (2-3-4-7-8) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (3-8) Bogue Electric Mfg Co 52 Iowa Ave Paterson 3 NJ (3-8)

NJ (3-8)
Caterpillar Tractor Co Peoria III (3-5)
Chandeysson Electric Co 4084 Bingham Ave St Louis 16 Mo (3-4-8)
Columbia Electric Mfg Co 4519 Hamilton Ave Cleveland 14 Ohio (8)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (2)
D & R Ltd 402 E. Gutierrez St P 0 Box 1500 Santa Barbara Calif (2-8)
Dayton Electric Mfg Co 126 Soakley Blvd Chicago 12 III (4)
Detroit Diesel Engine Div General Motors Corp 13400 W Outer Dr Detroit 28 Mich (3)
Electric Indicator Co Inc Camp Ave Springdale Conn (8)
Electric Products Co 1725 Clarkstone Rd Cleveland 12 Ohio (8)
Electric Specialty Co 211 South St Stamford Conn (8)
Elliott Co Jeannette Pa (1-2-3-5-8)
Empire Corp 1566 S 37d St Milwaukee 14 Wis (3-4)
Fairbanks Morse & Co Electrical Div 303 N Empire (3-4) 13-4)
Fairbanks Morse & Co Electrical Div 303 N
Henderson Freeport III (3-4-8)
GM Diesel 13400 Outer Dr Detroit 28 Mich (3)
General Electric Co Apparatus Sales Schenectady
5 NY (2-3-5 thru 8)
GRAYBAR ELECTRIC CO INC 420 Lexington
Ave NY 17 NY (8)—ADV PG 2

Harnischfeger Corp 4400 W National Ave Mil-waukee 46 Wis (3) Hertner Electric Co 12690 Elmwood Ave Cleve-land 11 Ohio (7-8) Homelite Div Textron Inc 67 Riverdale Ave Port Chester NY (4) Chester NY (4)
Howard Industries Inc 1760 State St Racine
Wis (4) NY (3-4-5)

NY (3-4-5) Inter NY (3-4-5)
Jeta Inc Yonkers NY (3-4)
Kato Engineering Co 1442 First Ave Mankato
Minn (8)
Katolight Corp First Ave at Chestnut (P 0 Box
891) Mankato Minn (3-4-8)
Kohler Co Kohler Wis (3)
Kurz & Root Sales & Engineering Corp 232 East
North Island St Appleton Wis (8)
Leach Corp 18435 Susana Rd Compton Calif
(8) (8) Marble Electric Corp Gladstone Mich (8)
Master Electric Div Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland Ohio Milwaukee Electric Tool Corp 5368 W State St Milwaukee 8 Wis (4) Moon Mfg Co 108 N Jefferson St Chicago 6 III (2) (8) Motoresearch Co 1600 Junction Ave Racine Wis (4) Nordberg Mfg Co 3073 S Chase Ave Milwaukee 1 Wis (3) 1 Wis (3)

Northwestern Electric Co 1750 N Springfield Ave Chicago 47 III (8)

Onan Div Studebaker-Packard Corp 2515 University Ave S E Minneapolis 14 Minn (3-4)

Petter Diesel Engine Div Brush Aboe Inc 34-14

58th St Woodside 77 NY (3)

Pioneer Gen-E-Motor Co 5841 W Dickens Ave Chicago 39 III (4)

Potter & Rayfield Inc P O Box 1042 Atlanta Ga (7) V)Pyle-National Co 1344 N Kostner Ave Chicago 51 III (2) Ready-Power Co 11231 Freud Ave Detroit 14 Mich (3-4)

Mich (3-4)

Reliance Electric & Engineering Co 24701 Euclid

Ave Cleveland 17 Ohio (8)

Safety Electrical Equipment Corp 1187 Dixwell

Ave New Haven Corn (8)

Thor Power Tool Co 175 N State St Aurora III (4)
Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (8)
U S Electric Motor Co Cadiz Ohio (3-4)
United States Motors Corp 102 W Fifth Ave Oshkosh Wis (3-4)
Universal Motor Co 438 Universal Dr Oshkosh Wis (3-4) Wis (3-4)

Waukesha Motor Co Waukesha Wis (3-4)

Welduction Corp 19400 W Eight Mile Rd (P 0

Box 146) Southfield Mich (8)

Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (1-2-5-8)

Wincharger Corp E Seventh & Division St Sloux City 2 Iowa (4)

Winpower Mfg Co Newton Iowa (3-4)

Young Engine Corp P 0 Box 532 Canton Ohio (4)

#### 8G. DYNAMOTORS

Rotating machine for changing de power from one voltage to another.

Bogue Electric Mfg Co 52 lowa Ave Paterson 3 NJ Carter Motor Co 2711 W George St Chicago 18 III intinental Electric Co Inc 325 Ferry St Newark 5 NJ Co 5 NJ
Dalmotor Co 1375 Clay St Santa Clara Calif
Dynamatic Div Eaton Mfg Co 3122 14th Ave
Kenosha Wis
Elcor Div F L Jacobs Co
Chicago 39 III
Electric Specialty Co 211 South St Stamford General Electric Co Apparatus Sales Schnectady 5 NY Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass Howard Industries Inc 1760 State St Racine Howard Industries Inc 1760 State St Racine Wis IMC Magnetics Corp 570 Main St Westbury NY Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn Sangamo Electric Co 11th & Converse Springfield Small Motors Inc 2076 Elston Ave Chicago 14 III
Wagner Electric Corp 6400 Plymouth Ave St
Louis 33 Mo Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa

Kurz & Root Sales & Engineering Corp 232 East North Island St Appleton Wis Marathon Electric Mfg Corp Wausau Wisc Matter Electric Div Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland Ohio Northwestern Electric Co 1750 N Springfield Avenue Chicago 47 III Reliance Electric & Engineering Co 24701 Euclid Ave Cleveland 17 Ohio Richardson-Allen Corp 116-15 Fifteenth Av College Point LI NY Safety Electrical Equipment Corp 1187 Dixwell Ave New Haven Conn Westinghous Electric Corp P O Box 2278 Pittsburgh 30 Pa

#### 8J. VARIABLE SPEED DRIVES

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Wis ectric Products Co 1725 Clarkstone Rd Cleve-land 12 Ohio Electric Lewis-Shepard Products Inc 125 Walnut St Water-Lewis-Shepard Products Inc 125 Walnut St Watertown Mass
Link-Belt Co 1700 Prudential Plaza Chicago 1 III
Morse Chain Co Borg Warner Corp Ithaca NY
Reeves Pulley Div Reliable Electric & Engineering Co 1225 7th St Columbus Ind
Servospeed Div Electro Devices Inc 4 Godwin Ave
Paterson NJ
Square D Co Executive Plaza Park Ridge III
Sterling Electric Motors Inc 5401 Telegraph Rd
Los Angeles 22 Calif

OU S ELECTRICAL MOTORS INC 200 E Slauson
Ave Los Angeles 54 Calif—ADV PG 124

#### 8H. EXCITERS

For providing and maintaining magnetic field of motors or generators.

Allis (Louis) Co 427 East Stewart St Milwaukee 1 Continental Electric Co Inc 325 Ferry St Newark 5 NJ Eicor Div F L Jacobs Co 4235 W North Ave Chicago 39 III Electric Specialty Co 211 South St Stamford Eliott Co Jeannette Pa Fairbanks Morse & Co Electrical Div 303 N Henderson Freeport III General Electric Co Apparatus Sales Schenectady 5 NY 5 NY
Hertner Electric Co 12690 Elmwood Ave Cleveland 11 Ohio
Ideal Electric and Mfg Co East First St Mansfield Ohio
Kato Engineering Co 1442 First Ave Mankato
Minn

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards

elsewhere in this issue. Description, Pages Catalog No. & Mfr. Guide Book Information for Emergency Power; 22p (Caterpillar) Generator Sets; 74p (Empire) 8-2 8-3 Servo Motors; 19p (IMC Magnetics) 8-4 Electric Power Plants; 22p (Onan) Furnace Fan Motors; 24p; Cat. No. B-9001 (Reliance) Electric Power & Light Plants; 54p (Universal)

#### SECTION 9. LIGHTING EQUIPMENT AND LAMPS

See Section 5 for fixture hangers and supports, ballasts, and other lamp accessories; dimmers are listed in 3J.

#### 9A. RESIDENTIAL LIGHTING FIXTURES

- 1. Ceiling downlights
  2. Ceiling suspended units
  3. Fluorescent
  4. Vaporproof
  5. Overall ceilings
  6. Wall brackets
  7. Bath mirror lights
  9. Stair tread lights
  10. Portable lamps (floor, table, desk, bed)
  11. Entrance, porch, driveway, patio lights
  12. Garden lights
  13. Illuminated house numbers
  14. Night lights
  15. Post lights
  15. Post lights
  16. Ultra-violet garden lighting

AOW Corp 450 N Ninth St Elwood Ind (10)
Abrams Lighting 785 Schuykili Ave Philadelphia
46 Pa (3-7) 46 Pa (3-7) re Lighting Products Co 171 Broad St SW Atlanta 3 Ga (1-2-3-6-7-11)

Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (3)
Acme Lite Products Co Inc Congers NY (10)
Active Specialty Corp Elm St Walden NY (1-2-6-7-10-11)
Adjusta Post Mfg Co 908 St Clair St Akron 7 Ohio (15) Aerolux Lights Corp 653 11th Ave New York 36 NY (10) Afco Lite Corp 1378 N Wolcott Chicago 22 III (11-12) Alkco Mfg Co 4242 N Lincoln Ave Chicago 18 All-Brite Light Co Amplex Corp 11 (1-6-10) 400 S 12 St Reading Pa (3) 1 Water St Brooklyn 1 NY (1-6-10)

Amplex Corp Glen Cove Rd Carle Place Long Island NY (6-10)

Apollo Lighting Fixture Co Inc 162 W Third St Mt Vernon NY (3)

Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (12)

Arrow Lamps Inc 1270 Broadway New York 1 NY (10)

Art Metal Co 1814 5-10 Ct Co 111 Water Art Metal Co 1814 E 40 St Cleveland 3 Ohio (1-6-7-9-11) (1-6-7-9-11)
Art Metal Lighting Div Wakefield Coro 1814 E
40 St Cieveland 3 Ohio (1-6-7-9-11)
Art Specialty Co 3720 N Milwaukee Ave Chicago
41 III (10)
Artcraft Lighting Co Inc 248 McKibben St Brookiyn 6 NY (2-6)

Artistic Lamp Mfg Co Inc 109 Eighth St Passaic NJ (2-10) rtoller Corp 141 Lanza Ave Garfield NJ (1-2-6-11-12) Artolier Corp 141 Lanza Ave Garfield NJ (1-2-6-11-12)
Atlas Electric Products Co 319 Ten Eyck St Brooklyn 6 NY (1-9-11)
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn (11)
Beckley Electric Co Inc 468-470 Grand Ave Brooklyn 38 NY (12)
Benjamin Div Thomas Industries Inc 207 E Broadmay Louisville 2 Ky (11-12)
Black (M) Mfg Co 300-08 N Third St Phila 6 Pa (11-12)
Black Awk Industries 250 5 Main St Dubuque Iowa (11)
Calpa Products Co 5420 Paschall Ave Phila 43 Pa (10)
Calumet Plastics Inc 11201 S Cottage Grove Avenue Chicago 28 III (13)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (12)
Ceiling Materials Co 200 Waring Rd Memphis 17 Tenn (5)
Columbia Electric & Mfg Co North 2310 Fancher Tenn (5)
Columbia Electric & Mfg Co North 2310 Fancher
Way Spokane Wash (5)
Comet Lamp Co 5 E 35 St New York 16 NY (2)
Compco Corp 1800 N Spaulding Ave Chicago 47
III (1-2-3-6-9-11) Condi-Lite Corp 889 Broadway New York 3 NY

Curtis Development & Mfg Co 3244 N 33 St Mil-waukee 16 Wis (13) Day-Brite Lighting Inc 6260 N Broadway St Louis 15 Mo (1) Dazor Mfg Corp 4481-99 Duncan Ave St Louis 10 Mc (10) Duralite Lanterns Inc 163 Long Beach Rd Island Park NY (11-15)
Duray Fluorescent Mg Co 3318 W Montrose Ave Chicago 18 [II (3) Chicago 18 III (3)
E J S Lighting Corp 321 E Pico Bivd Los Angeles
21 Calif (1-2-6-10)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza
South Long Island City 1 NV (6-7-9-10-11)
Eagle Mfg Co 3508 Avalon Bivd Los Angeles 11 Eagle Mfg Co : Calif (1-6-10)

Edmor Lamp Co Inc 1867 Flatbush Ave Brooklyn
10 NY (6-10)

Flectric House Number Co 8670 W Washington
Slvd Culver City Calif (13)

Elite Glass Co Inc 111 W 22nd St New York 11

NY (1-2-6)

Ferson-Invarial Linkhim Co Lawtheron 2nd NY (1-2-6)
Emerson-Imperial Lighting Co Loyalhanna Park
Latrobe Pa (1-2-6-7-11)
Emerson-Pyme Co Towne Ave at Monterey (P 0
Box 6-98) Pomona Calif (1-11)
Exty Mfg Co 112 S Sangamon St Chicago 7 III
(1-2-3-6-7-11) Esty Mfg Co 112 S Sangamon St Cincago 7 III
(1-2-3-6-7-11)

Everglow Lighting Fixture Co Inc 332 E Jericho
Turnpike Huntington Station NY (3-11)

Federal Lighting Corp 1425 Rockwell Ave Cleveland
14 Ohio (1-2-3-6-11-3)

Flexo International Corp 3720 N Milwaukee Ave
Chicago 41 III (10)

Fluorescent Equipment & Mfg Co 5105 Cowan Ave
Cleveland 27 Ohio (3-7)

Fluorescent Fixtures of California 352 Shaw Rd
South San Francisco Calif (3)

Fristic (H C) Co 1120 E Pico Blvd Los Angeles 21

Calif (1-2-4-5-6-11)

Gem Electric Mfg Co Inc 237 37th Street Brook-Gem Electric Mfg Co Service Se Gem Electric Mfg Co Inc 237 37th Street Brook-lyn NY (11-14) 22 III (3)
Guth [Edwin F) Co 2615 Washington Blvd St Louis
3 Mo (1-3-5-6-11)
adco Aluminum Products Co PO Box 128 Littlestown Pa (11)
Hasso Electric Corp 30 Grove Ave New Rochelle
NY (3-12)
Replacement Co. Inc. 342 Madison Ave New York 17 Holophane Co Inc 342 Madison Ave New York 17 NY (11) House-O-Lite Corp 2430 S Ashland Ave Chicago 8 Independent Protection Co Inc 1605-07 S Main St Goshen Ind (11-12) Industrial Lamp Corp 14th & Blaine Sts Elkhart Ind (10) Ind (10)
International Lighting Mfg Co 1825 N 19 St St Louis 6 Mo (1-2-3-6-7-11-12)
Jackson Electrical Co 900 W Van Buren St Chicago 7 Ill (11)
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn 38 NY (1-2-6-7)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16
Pa (3)
Kalsan Electric Co Inc 146 Meet St Consorted Pa (3)
Kaisan Electric Co Inc 146 Mott St Oceanside
LI NY (1-2-6-11)
Kelly Specialty Co 5958-60 Washington Blvd Chicago 44 III (13)
Kent Lighting Corp 500 Johnson Ave Brooklyn 37
NY (1-3-6) NY (1-3-6)

Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa (3-6)

Kichier (L D) Co 2101 Superior Ave Cleveland 14 Ohio (1-2-6-7)

KILLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (4-12)—ADV PG 78-79

Kirlin Co 3435 E Jefferson Ave Detroit 7 Mich (1-9-11)

Kiegi Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1)

Kilgi Em Mfg Co 6822 Lymford St Philadelphia Pa (3)

Koch & Lowy Inc. 201 E 34 St May Virgin Co Inc. (3) (3)

Koch & Lowy Inc 201 E 34 St New York 16 NY
(6-10)

LAM Inc 414 Main St Wakefield Mass (3-6-7)

Leader Lamp Mfg Co 476 Broome St NY 13 NY
(12-6-7-11) Lightolier Inc 346 Claremont Ave Jersey City 5 NJ (1-2-3-6-7-10-11-12) Litecraft Mfg Corp 100 Dayton Ave Passaic NJ (1-2-3-5-6-9-11) Lighting Products Co Box 206 Conyers Ga (3) Luminous Ceilings Inc 3701 N Ravenswood Ave Chicago 13 III (5) Magni Flood Inc 50 Crary Ave Mt Vernon NY (11.72) Magni Fio (11-12) Majestic Metal Spinning & Stamping Co Inc 537 Sackett St Brooklyn 17 Ny (1-2-6) Markel Electric Products Inc 145 Seneca St Buffalo 3 Ny (1-2-6-11-12) Marks Mfg Co 700 N Carpenter St Chicago 22 III (10)

Markstone Mfg Co 1531 N Kingsbury Chicago 22 111 (1-2-3-6-7-11)

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McPhilben Mfg Co Inc 1329 Willoughby Ave Brooklyn 37 NY (4-7-9-11)
Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo (3)
Miller Co Illuminating Div 99 Center St Meriden Conn (2)
Mirce Electron Co. Inc. 40 Basselmy Ave. Imagod II. Conn (2)

MiroFlector Co Inc 40 Bayview Ave Inwood LI
NY (1-2-6-7-10-11)

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Spaulding Ave Chicago 47 Ill (1-3)

Modern Swimming Pool Co Inc 1 Holland Ave
White Plains NY (4)

Moe Light Div Thomas Industries Inc 207 E
Broadway Louisville Ky (1-2-3-5-6-7)

N L Corp 2480 E 22 St Cleveland 15 Ohio
(1-11-13)

Nemco Electric Co 230 Secretary 15 Ohio (1-11-13)

Nemco Electric Co 210 Second Ave Seattle 4
Wash (1-2-4-6-7-11-12)

Neo-Ray Products Inc 315 E 22 St NY 10 NY (3)

Novelty Lighting Corp 2480 E 22 St Cleveland 15
Ohio (1-11-13)

Ohio (1-11-13)

Osco Mfg Co P 0 Box 7268 Ft Worth Tex (11)

Pass & Seymour Inc Syracuse 9 NY (1-6-7-11)

Perfect-Line Mfg Corp Old Country Rd & Railroad

Ave P 0 Box 65 Hicksville LI NY (10-11-12)

Pittsburgh 22 Pa (3-5)

Prescolite Mfg Corp o Civer Bldg Mellon Square

Pittsburgh 22 Pa (3-5)

Prescolite Mfg Corp o Castor Ave & Tulin St Phila

Pogress Mfg Co Inc Castor Ave & Tulin St Phila Calif (1-2-6-7-9-10-11)
Progress Mg Co Inc Castor Ave & Tulip St Phila
34 Pa (1-2-3-6-7-10-11-12)
Project Fixture Mfg Corp 55 Ongley St Rockville
Centre NY (1-2-5-6-7-10-11-12)
Quaker City Electric Mfg Co 2810 E Pacific St
Phila 34 Pa (3)
Rab Electric Mfg Co Inc 605 E 132 St New
York 54 NY (4-11-12)
Rembrandt Jamp Corp - 6500 W Division St Chicago TOTK 39 AT LATE COTP 4500 W Division St Chicago 51 III (10)
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 III (12)
Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (10) Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (12)
Rossell & Stoll Co Inc 125 Barclay St (12)
Segil (L J) Co 2500 W North Ave Chicago 47
III (1-2-3-11)
Shaida Mfg Co Inc 156 W Providencia Ave Burbank Calif (12)
Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (3)
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Steber Div Pyle-National Co 2700 Roosevelt Rd Broadview III (11-12)
Sterberg Mfg Co 4510 Addison St Chicago 41
III (11) broadview III (14-12) Sternberg Mfg Co 4510 Addison St Chicago 41 III (11) Stocker & Yale Inc Green St Marblehead Mass (10) (10)
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Sylvania Electric Products Inc 730 Third Ave New York 19 NY (1-2)
Tolen (William) & Son Inc 4041 Ridge Ave Philadelphia Pa (10) Tower Craft NJ (10) raftsmen Inc 105 Chestnut St Red Bank NJ (10)
Trojan Lighting Co 663 State St San Diego Calif (1)
Ultra-Violet Products Inc 5114 Walnut Grove Ave San Gabriel Calif (16)
Union Insulating Co Inc 80x 351 Parkersburg W Va (11-12)
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif (5)
Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-2-6-10) land 1 Calif (5)

Versen (Kurt) Co 4 Slocum Ave Englewood NJ
(1-2-6-10)

Virden (John C) Co 5009-6103 Longfellow Ave
Cleveland 3 Ohio (1-2-3-6-7-11-12)

Voltarc Tubes Inc 44 Cross St Norwalk Conn (3)

Weiss & Bihelier Merchandise Corp 40 W 20 St
New York 11 NY (1-2-6)

Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (3-14)

White (0 C) Sales Co 40 Green St Marblehead
Mass (10)

Wilson (J A) Lighting & Display Inc 1502 Indus
trial Dr Erie Pa (1)

9C. COMMERCIAL, INSTITUTIONAL & IN-DUSTRIAL LIGHTING EQUIPMENT

Incandescent fixtures
 Fluorescent fixtures
 Mercury & sodium vapor fixtures
 Act lightling equipment
 Neon lighting
 Explosion-proof fixtures
 Vaporproof fixtures
 Ust-tight fixtures
 Ust-tight fixtures
 Wornling light
 Complete luminous celling systems
 Worning light
 Plot & indicating light assemblies
 Showcase & display lighting
 Emergency lighting unit & systems
 Stage lighting

16. Church lighting
17. Hospital lighting
18. Exit lights
19. Public building lighting
20. Battery-operated fluorescent fixtures
21. Lighted display signs
22. High-bay lighting
23. Ornamental lighting
24. Ultra-violet display lighting

See also "Outdoor Lighting".

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (1) Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (2-13) Acme Lighting & Mfg Co 949 E 31 St Los Angeles 11 Calif (2-13) Angeles 11 Calif (2-13) Ohio (8) Ohio (8)
Adjustable Fixture Co 104 E Mason St Milwaukee
2 Wis (1-17)
Ainsworth Lighting Inc 38-10 Twenty-Ninth St
L I C 1 NY (1-2)
Alkco Mfg Co 4242 N Lincoln Ave Chicago 18
III (1-2) II-Brite Light Co 400 S 12 St Reading Pa (2-13) (2-13)

Amplex Corp Glen Cove Rd Carle Place Long Island NY (1-13)

Apolio Lighting Fixture Co Inc 162 W Third St Mt Vernon NY (1-2)

Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (1-2-3-7-8-9)

Art Metal Lighting Div. NO. C. Cleveland 3 Ohio (1-13)

Art Metal Lighting Div. NO. C. C. Art Metal Co 1814 E 40 St Cleveland 3 Ohio (1-13)
Art Metal Lighting Div Wakefield Corp 1814 E 40 St Cleveland 3 Ohio (1-13)
Art Careful Co 1nc 248 McKibben St Brooking 6 Ny (1-2-13)
Atlas Electric Products Co 319 Ten Eyck St Brooking 6 Ny (1-2-11)
B M D & R Inc 7020 Walker St St Louis Park Minneapolis 16 Minn (1-2-11)
Baker-Barkon Co 1335 S W Morrison St Portland Ore (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1-2-3-7-8-9-11-13)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (14)
Canning-Pekara Inc 2144 N Wood St Chicago 14 III (2-13-16)
Capitol Hardware Mfg Co Inc 400 N Leavitt St Chicago III (13)
Capitol Hardware Mfg Co Inc 400 N Leavitt St Chicago III (13)
Capitol Hardware Mfg Co Inc 527 W 45 St New Capitol Hardware Mfg Co Inc 400 N Leavitt St Chicago III (13)
Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (1-15)
Carpenter Mfg Co 2250 Gilman Square Somerville 45 Mass (11)
Celling Materials Co 200 Waring Rd Memphis 17 Tenn (10)
Centralite Co Inc. Dayton & Central Aves Cincing Centralite Co Inc Dayton & Central Aves Cincin-nati 14 Ohio (2) Century Lighting Inc 521 W 43 St New York 36 NY (1-13-15) NY (1-13-15)

Clean Sweep Co 6534/x Whittier Blvd Los Angeles 22 Calif (14)

Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (4-7-8-13)

Cole (C W) & Co Inc P O Box 3382 Los Angeles 54 Calif (1-2-13-15-21)

Colonial Electric Products Div Colonial Neon Co Inc 1-115 Market St East Paterson NJ (2)

Colombia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (2-9-10-13)

Compco Corp 1800 N Spaulding Ave Chicago 47 III (1-2-13)

Condi-Lite Corp 889 Broadway New York 3 NY ondi-Lite Corp 889 Broadway New York 3 NY (1-2) (1-2)
Control Switch Div Controls Co of America 421830 W Lake St Chicago 24 III (12)
Controls Co of America Control Switch Div 1420
Delmar Dr Folcroft Pa (12)
Cooper Hewitt Electric Co 720-732 Grand St
Hoboken NJ (2-3)
Crouse-Hinds Co Syracuse 1 NY (1-2-3-7-8-911-13)
Crownlite Fluorescent Co 7 Roselle St Mineola
NY (2-10-13)
Crots Lighting Div Curtis-All Brite Lighting Inc
6135 W 65 St Chicago 38 III (1-2-3)
Cutler-Hammer Inc 228 N 12 Street Milwaukee 1
Wis (12)
Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa (4-13) Day-Brite Lighting Inc 6260 N Broadway St Louis 15 Mo (1-2) Dazor Mfg Corp 4481-99 Duncan Ave St Louis 10 Mo (1-2) Mo (1-27)
Derrick Light & Equipment Co 1201 E Daggett
(P O Box 414) Fort Worth Tex (7-8-9)
Dialight Corp 60 Stewart Avenue Brooklyn 37 NY (18)
Dixie Controller Inc Post Office Box 5844 Birmingham 9 Ala (14-15)
Drake Mfg Co 4626 N Olcott Harwood Heights Chicago 31 III (12)
Dual-Lite Co Inc Newtown Conn (14-18)
Duray Fluorescent Mfg Co 3318 W Montrose Ave Chicago 18 III (2)
Duro-Test Corp 2321 Hudson Blvd North Bergen NJ (1-2-11-13)
EJ S Lighting Corp 321 E Pico Blvd Los Angeles 21 Calif (1)
Electric Cord Co 432 Plane St Newark 2 NJ (11-14)
Electric Cord Co 432 Plane St Newark 2 NJ (11-14) (18) (11-14)
Electric Lighting Sales Inc P U Box 1907 Stockton
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Everglow Lighting Fixture Co Inc 332 E Jericho Turnpike Huntington Station NY (1-2)

Fannon (John J) Products Co 3000 E Woodbridge Detroit 7 Mich (10)

Federal Lighting Corp 1425 Rockwell Ave Cleveland 14 (hio (1-2)

FEDERAL SIGN & SIGNAL CORP 13626 S Western Ave Blue Island III (11)—ADV PG 118

Felco Products Inc 8700 Ambassador Row Dallas 19 Tex (2)

Fex International Corp 3720 N Milwaukee Ave Chicago 41 III (1-2)

Fluores-0-Lite Co Evans Terminal North Broad St Hillside 5 NJ (1-2-13)

Fluoresco-tt Equipment & MfG Co 5105 Cowan Ave Hillside 5 NJ (1-2-13)
Fluorescent Equipment & Mfg Co 5105 Cowan Ave
Cleveland 27 Ohio (1-2-13)
Fluorescent Fixtures of Califordia 352 Shaw Rd
South San Francisco Calif (2)
Frish Corp 211 63rd St Brooklyn 20 NV (1-2-18)
Frishie (H C) Co 1120 E Pico Blvd Los Angeles 21
Calif (1)
Fullerton Mfg Co Williard Rd Norwalk Cons
(1-2-10)
Garcy Lighting Diy, Garden City Plating & Mfg Co Garcy Lighting Div Garden City Plating & Mfg Co 2475 Elston Ave Chicago 47 Ill (1-2-13)
Gedney Electric Co Americas Bldg Radio City NY 20 NY (8)

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn (1-2-3-7-8-9-11-14-18-19-20)
ADV PG 84-85 ADV PG 84-85 ineral Lighting Co 248 McKibbin St Brooklyn 6 NY (1-2-13) bson Mfg Co 1919 Piedmont Circle NE Atlanta Gisson Mtg Co 1919 Pledmont Circle NE Atlanta
Ga (2)
Gleason Sales Co Inc 5809 W Montrose Ave Chicago 34 III (1)
Globe Lighting Products Inc 1710 Flushing Ave
Brooklyn 37 NY (1-2-13)
GOOD MFG CO 1015 N Halsted St Chicago 22 III
(2)—ADV PG 120
GRAYBAR ELECTRIC CO INC 42 Lexington Ave
NY 17 NY (1-2)—ADV PG 2
Great Northern Mfg Corp 1056 N Wood St Chicago
22 III (2-13)
Gruber Bros Inc 125 South First St Brooklyn 11
NY (1-2-9-13)
Guth (Edwin F) Co 2615 Washington Blvd St Louis
3 Mo (1-2-3-9-13-15)
Hasco Electric Corp 30 Grove Ave New Rochelle
NY (1-2-13)
Nolophane Co Inc 342 Madison Ave New York 17 NY (1-2-13) Or a rove Ave New Rochelle Holophane Co Inc 342 Madison Ave New York 17 NY (1-2-3-8-9-10) House-0-Lite Corp 2430 S Ashland Ave Chicago 8 III (2-13-14) b Electric Co 2255 W Grand Ave Chicago 12 III (1-2-11-15)
Illuminating Engineering Co 2347 East Nine Mile
Rd Hazel Park Mich (4)
Industrial Devices Inc. Edgewater 19 NJ (12)
Integrated Cellings & Grilleworks Inc. 11766 W Pico
Blvd Los Angeles 64 Calif (10)
International Lighting Mfg Co 1825 N 19 St Louis
6 Mo (1-2)
Lackson Electrical 6 Mo (1-2)
Jackson Electrical Co 900 W Van Buren St Chlcago 7 Ill (1-8-9)
Jay Lighting Mfg Co Inc 23-29 Quincy St Brooklyn 38 New York (1)
Joleco Corp 2513 Baldwin St St Louis 6 Mo (1-2-21)
Joy Mfg Co Electrical Products Div 1201 Macklind
Ave St Louis 10 Mo (9)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16
Pa (2)
Kalsan Electric Co Inc 146 Base St Pa (2)
Kalsan Electric Co Inc 146 Mott St Oceanside
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Kayline Co 1241 E 45 St Cleveland 14 Ohio (1-2)
Kelly Specialty Co 5958-60 Washington Blvd Chlcago 44 Ill (11)
Kembert-Arpag Co 220 Coster St Bronx 59 NY (2)
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St Louis 13 Mo (1-3-7-8-9-12-13)—ADV PG
78-79 (H R) Co 8 King St Morristown NJ (11-12) 3435 E Jefferson Ave Detroit 7 Mich Kirlin Co 3435 E Jefferson Ave Detroit 7 Mich (1-2-13-18) Kliegl Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1-2-14-15) Kligitte Mfg Co 6822 Lynford St Philadelphia Pa (2-13) Koch (1) & Lowry Inc 201 E 34 St New York 16 NY (1)
ord (Leonard E) Co 2751 N Emerson Ave
Indianapolis 18 Ind (1-2-16)
urtzon (Moris) Inc 1420 S Talman Ave Chicago 8 Hotelstepon Moris) Inc 1420 S Talman Ave Grown Moris) Inc 1420 S Talman Ave Grown Moris Inc (1-2-11-13)
LAM Inc 414 Main St Wakefield Mass (1-2-16-17-19)
Lam Inc 414 Main St Wakefield Mass (1-2-16-17-19)
Lam Inching Box 157 Olive Branch Miss & P Lighting Box 157 Olive Branch Miss (2-10-13-16) Larco Inc Route 20 East Painesville Ohio (9-11) Leecraft Mfg Co Inc 58 Greene St New York 12 NY (12)

Lightalarms Inc 95 Atlantic Ave Brooklyn 1 NY (14) Lighting Dynamics Inc 300 N Baldwin Park Blvd City of Industry Calif (1-2-13) Lighting Products Inc 1549 Park Ave West High-land Park III (2) land Park III (2)
Lightmore Appliance Corp 651-5 Driggs Ave Brooklyn 11 NY (21)
Lightolier Inc 346 Claremont Ave Jersey City 5
NJ (1-2)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukee Wis (1-2)
Litecontrol Corp 36 Pleasant St Watertown 72
Mass (1-2-13)
Litecraft Mfg Corp 100 Dayton Ave Passaic NJ
(1-2-8-9-10-13)
Lithonia Lighting Products Co Row 206 Convers Lithonia Lighting Products Co Box 206 Conyers Ga (2-13) Lumi Dyne Corp 627-39 Banning St Los Angeles 12 Calif (10) 12 Calif (10)

Luminous Ceilings Inc 3701 N Ravenswood Ave
Chicago 13 III (2-10-13)

Luxor Lighting Products Inc 350 5th Ave New
York 1 NY (1-2)

Magni Flood Inc 50 Crary Ave Mt Vernon NY (13)
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Chicago 39 III (15)
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McPhilben Mfg Co Inc 1329 Willoughby Ave
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Meierjohan-Wengler 1102 W 9th St Cincinnati 3
Ohio (16-19) Ohio (16-19)

Metalcraft Products Co Inc 6225 State Rd Philadelphia 35 Pa (2)

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Midwest Lighting Products Co P 0 Box 536 Edgewater Branch Cleveland 7 Ohio (1)

Miller Co Illuminating Div 99 Center St Meriden Conn (1-2-3-8-9)

MiroFletor Co Inc 40 Bayolew Ave Inwood 11 MiroFlector Co Inc 40 Bayview Ave Inwood LI NY (1-13-15) NY (1-13-15)

Mitchell Lighting Div Compco Corp 1800 N
Spaulding Ave Chicago 47 · III (1-2-13)

Modern Light Co Inc 7809 Maplewood Industrial
Court St Louis 17 Mo (2)

Moe Light Div Thomas Industries Inc 207 E
Broadway Louisville Ky (1-2)

Moldcast Mfg Co 236 South St Newark 5 NJ
(1-3)

Mole-Richardson Co. (1-3)
Mole-Richardson Co 937 N Sycamore Ave Hollywood 38 Calif (5)
Multi Electric Mfg Inc 4223 W Lake St Chicago
24 III (1-2-3-8-9) Neo-Nay Products Inc 315 E 22 St NV 10 NV (1-2-10-13-15)
Nepco Mfg Co 4230 N Sayre Chicago 34 III (13)
Nicad Div Gould-National Batteries Inc Easthampton Mass (14)
Noel Mfg Co 3 W 18 St New York 11 NY (1)
Northern Incandescent Lamp Co 1 Newark St Hoboken NJ (1)
Northern Light Co 1661 N Water St Milwaukee 2 Wis (2-10-13)
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 III (1-8)
Palco Mfg Co 1260 Pennsylvania Ave San Francisco 7 Calif (17)
Paramount Industries Inc G-1080 Ballanger Rd Filin 4 Mich (2)
Penetray Corp 615 Front St Toledo 5 Ohio (1-3-15)
Penn (W M) Fluorescent Light Mfg Co 426 E Allegheny Ave Philadelphia 34 Pa (2-13)
Perfectite Co 1457 E 40 St Cleveland 3 Ohio (1-3-18) Allegheny Ave Philadelphia 34 Pa (2-13)
Perfectite Co 1457 E 40 St Cleveland 3 Ohio
(1-8-18)
Perfect-Line Mfg Corp Old Country Rd & Railroad
Ave P 0 Box 65 Hicksville LI NY (8-9-13)
Perkins Battery Co 214 Golden Lane New Oxford Pa (14)
Phillips (Oscar) Co 9701 Reading Rd (Box 21)
Cincinnati 15 Ohio (2)
Pittsburgh Reflector Co Oliver Bidg Mellon
Square Pittsburgh 22 Pa (1-2-10-13)
Portable Light Co Inc 65 Passaic Ave Kearny
NJ (11-14)
Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Prescolite Mfg Corp 2229 Fourth St Berkeley 10 Calif (1-2-13-18) Price Bros Inc 4301 W Madison St Chicago 24 III (11)
Project Fixture Mfg Corp 55 Ongley St Rockville Centre NV (1-11)
Pyle-National Co 1344 N Kostner Ave Chicago 51
III (7-8-9-11-12)
QUADRANGLE MFG CO 32 S Peoria St Chicago 7 III (1-3-8-9-11-13)—ADV PG 123
Quaker City Electric Mfg Co 2810 E Pacific St Phila 34 Pa (2-13)
Rab Electric Mfg Co Inc 605 E 132 St New York 54 NY (7-8)

Rambusch Decorating Co 10 W 13 St New York 11 NY (1-16-23)
Revere Electric Mfg Co 7420 N Lehigh Ave Chicago 48 III (1-2)
Ruby-Philite Corp 32-02 Queens Blvd L I C 1
NY (1-2)
Reveal A Stall Co Loc 125 Barciay St NY 7 Russell & Stoll Co Inc 125 Barclay St NY 7 NY (7-8-9) NY (7-8-9)
Scranton Storage Battery Corp Archbald Pa (14)
Segil (L J) Co 2500 W North Ave Chicago 47 III (2-13)
Sentry-Lite & Battery Div Hobby & Brown Electronic Corp 237 Sunrise Highway Rockville Centre NY (14)
Shalda Mfg Co Inc 156 W Providencia Ave Burbank Calif (1-3-8-9-11-13-14)
Silvay Lighting Inc 100 W Main St Bound Brook NJ (1-2-13)
Simes Co Inc 114 15th Ave College Point LI NY (1-2-3-8-9-11-17)
Sireno Signal Mfg Co 65 Passaic Ave Kearny NJ (11)
Smithcraft Corp 217 Everett Ave Chelsea 50 Sireno Signal MMg Co 65 Passaic Ave Kearny NJ (11)

Smithcraft Corp 217 Everett Ave Cheisea 50 Mass (2-10)

Smoot-Holman Co 321 N Eucalyptus Ave (P 0 Box 4097) Inglewood Calif (1-2-3-8-9)

Solar Light MMg Co 400 N Ashiand Chicago 22 III (1-2-13)

Solux Corp 58-17 28th Ave Woodside 77 Li NY (1-2-8-11-13)

Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (2)

Stabrite Fluorescent M/g Co 3550 Northwest 49 St Miami Fia (1-2-13)

Stamford Metal Specialty Co Inc 429 W Broadway New York 12 NY (1-2)

Standard Electric Time Co 89 Logan St Spring-field 2 Mass (14)

Standard Portable Cord Co Inc Mayville NY (14)

Steber Div Pyle-National Co 2700 Roosevelt Rd Broadview III (1-8-13-22)

Sternberg M/g Co 4510 Addison St Chicago 41 III (1-16)

Stocker & Yale Inc Green St Marbiehead Mass (2-2-13) Stocker & Yale Inc Green St Marblehead Mass (2-9-13) (2-9-13) Marolenead Mass
Stonco Electric Products Co 333 Monroe Ave
Kenilworth NJ (1-3-8-9-11-13-14-15-18-19)
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7
Mich (1-2-13)
Sunbeam Lighting Co 777 E 14 PI Los Angeles
21 Calif (1-2-13-17)
Superior Electric Co 83 Laurel St Bristol Conn
(15) (15) Supreme Lighting Co 600 E Turner St Los An-geles Calif (1-2) Surrette Storage Battery Co Inc Jefferson Ave Salem Mass (14) Salem Mass (14)
Suttle Equipment Corp 135 S LaSaile St Chicago 3 III (12)
Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (2)
Swivelier Co Inc Nanuet NY (1-2-13)
Sylvania Electric Products Inc 730 Third Ave New York 19 NY (1-2-12)
Tedcar Products Co Box 1209 Union NJ (11)
Tod Lite Inc 3401 NW 10th St Okiahoma City Okia (14)
Transolite Corp 515 Madison Ave New York 34 Transolite Corp 515 Madison Ave New York 36 NY (2) ri-Part Mfg Co 359 S Jessie St (P 0 Box 178) Pontiac Mich (2-8-13) Trippe Mfg Co 133 N Jefferson St Chicago 6 III (11) Trojan Lighting Co 663 State St San Diego Calif (1) U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 III (11)
Ultra-Violet Products Inc 5114 Walnut Grove Ave
San Gabriel Calif (24)
Union Insulating Co Inc Box 351 Parkersburg
W Va (8-9)
United Lighting & Ceiling Co 2828 Ford St Oakland 1 Calif (10-19)
United States Radium Corp
town N (11-12-14)
V V Fitting Co P 0 Box 1253 Merchantville NJ
(8-9) V Fitting Co P U Box 1253 merchantene (8-9)
Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-13-17)
Virden (John C) Co 5009-6103 Longfellow Ave Cleverland 3 Ohio (2)
Voigt Co 1366 N Carlisle St Phila 21 Pa (16-18)
Wakefield Lighting Div Wakefield Corp 731 S Water St Vermillon Ohio (1-2-10)
Web Electric Mfg Co 1701 SW Jefferson St Portland 1 Ore (1)
Weiss & Biheller Merchandise Corp 40 W 20 St New York 11 NY (1)
Wellmade Metal Products Co 860 81st Ave Oakland 21 Calif (2-10)
Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa (7-12-15-16-17-19)
Westinghouse Electric Corp Lighting Div 1216 W 58th St (P O Drawer 5817) Cleveland 1 Ohio (1-2-3-9)
WESTINCHOUSE ELECTRIC SUPPLY CO 3 Gate-way Center (80x 448) Pittsburgh 30 Pa (1-2-3-8-9)—ADV PG 2nd Cover Wayeler Reflector Co 275 Congress St Boston 10 Mass (1-2-3-8-9-13)
White (O C) Sales Co 40 Green St Marblehead Mass (1-2) (8-9)Wide-Lite Corp P O Box 191 Houston 1 Tex (3-8) Wiley (R & W) Inc Dearborn & Bridge St Buffalo 7 NY (2) Williams (H E) Products Co 106 S Main St Car-thage Mo (2-13)

Wilmot Castle Co Box 629 Rochester 2 NY (7-17) Wilson (J A) Lighting & Display Inc 1502 Industrial Dr Erie Pa (1-10) Conn (13)—ADV PG 4 Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 III (8) Woodward Machine Co Lighting Div 4833 Elmhurst Detroit 4 Mich (8-9) Work-O-Lite Co 522 Cortlandt St Belleville 9 NJ (2-13)

#### 9D. OUTDOOR LIGHTING EQUIPMENT

1. Airport lighting
2. Floodlights
3. Beacons & searchlights
4. Sportlights
5. Street & highway lighting
6. Lighting towers, poles & standards
7. Sign lighting
9. Traffic signals & controls
10. Service station lighting
11. Marine lighting
12. Underwater lighting
13. Parking and area lighting
14. Bridge lighting
15. Underwater lighting
15. Underwater lighting

Equipment manufactured for specialized commercial and residential applications. Residential outdoor lighting is included in Residential Lighting, Sec. 9A.

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (2) Abrams Lighting 785 Schuylkill Ave Philadelphia 46 Pa (4) Lite Corp 1378 N Wolcott Chicago 22 III (2)
Alexander-Tagg Industries Inc. Jacksonville Road at Summit Ave Hatboro Pa (4)
American Concrete Corp 5092 N Kimberly Ave Chicago 30 III (6)
Appleton Electric Co. 1701-59 Wellington Ave Chicago 13 III (2)
Art Metal Lighting Div Wakefield Corp 1814 E 4G St. Cleveland 3 Ohio (2-4)
Beckley Electric Co Inc. 468-470 Grand Ave Brooklyn 38 NY (2-4)
Benjamin Div Thomas Industries Inc. 207 E Broadway Louisville 2 Ky (2) (2)

Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (2) Canning-Pekara Inc 2144 N Wood St Chicago 14 111 (2)
Carpenter Mfg Co 2250 Gilman Square Somerville
45 Mass (8)
Cold Cathode Lighting Corp 76 S Bayles Ave Port
Washington NY (5)
Cole (C W) & Co Inc P O Box 3382 Los Angeles 54
Calif (4)
Calif (4)

Colonial Electric Products Div Colonial Neon Co Inc 1-115 Market St East Paterson NJ (5-6-10-13)

10-13)

Columbia Electric & Mfg Co North 2310 Fancher Way Spokane Wash (2-7-10)

Compco Corp 1800 N Spaulding Ave Chicago 47 III (2-5-10-13)

Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (5)

Crouse-Hinds Co Syracuse 1 NY (1 thru 5)

Cutler Electrical Products Inc 5524 Haverford Ave Philadelphia Pa (7)

Derrick Light & Equipment Co 1201 E Daggett (P 0 80x 414) Fort Worth Tex (2)

Dryomatic Corp 715 N Fayette St (P 0 80x 591)

Alexandria Va (9)

Duro-Test Corp 2321 Hudson Blvd North Bergen Dryomatic Corp 71.5 N Fayette St (P 0 Box 591)
Alexandria Va (9)
Duro-Test Corp 2321 Hudson Blvd North Bergen
NJ (2)

Electric Lighting Sales Inc P 0 Box 1907 Stockton Calif (5-10) Electro Lighting Corp 1536 S Paulina St Chicago 8 III (2-4)

Efreco Corp 2000 Central Ave Cincinnati 14 Ohio (6) Emarco Corp 1950 Neva Drive Dayton 14 Ohio (8) General Electric Co Apparatus Sales Schenectady

General Electric Co Apparatus Sales Schenectady
NY (2-3-5)
GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1-2-4 thru 8-10-13)—
AVP P6 84-85
Globe Lighting Products Inc 1710 Flushing Ave
Brookin 37 NY (4)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1-3-5)—ADV PG 2
Great Northern Mfg Corp 1065 N Wood St Chicago
22 III (2-5)
Guardian Light Co 500 N Blyd Oak Park III (5-6)
Guth (Edwin F) Co 2615 Washington Blyd St Louis
3 Mo (2)
Holophane Co Inc 342 Madison Ave New York 17

olophane Co Inc 342 Madison Ave New York 17 NY (2-5) House-0-Lite Corp 2430 S Ashland Ave Chicago 8

Hufb Electric Co 2255 W Grand Ave Chicago 12 III (4)

Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (1-2-5)
Hughey & Phillips Inc 3200 North San Fernando Bird Burbank Calif (8)
Jackson Electrical Co 900 W Van Buren St Chicago 7 III (2-4-13)
Joslyn Mfg & Supply Co 3700 S Morgam St Chicago 9 III (5)
Joy Mfg Co Electrical Products Div 1201 Mackind Ave St Louis 10 Mo (2-4)
Joy Mfg Co H W Oliver Bidg Pittsburgh 22 Pa (2) K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (2)

K-B Lighting Mrg Co 2010 Byberry No Phila 18
Pa (2)
Kalsan Electric Co Inc 146 Mott St Oceanside
LI NY (4)
Kayline Co 1241 E 45 St Cleveland 14 Ohio (4)
Kenworth Co Winsted 1 Minn (2)
Kerrigan Iron Works Co 1033 Herman St Nashville 2 Teon (5-6)

MKILLARK ELECTRIC MFG CO 3940 Easton Ave
St Louis 13 Mo (2-4-5)—ADV PG 78-79
Kliegl Bros Universal Electric Stage Lighting Co
Inc 321 W 50 St NY 19 NY (2-4)
Kord (Leonard E) Co 2751 N Emerson Ave
Indianapolis 18 Ind (6-13)
Line Material Industries McGraw-Edison Co
W Michigan St Milwaukse Wis (1-2-3-5)
Magni Flood Inc 50 Crary Ave Mit Vernon NY (2)
Manning (RA) Co Inc 1810 North Ave Sheboygan
Wis (2)
Warselle Co Inc 179 N 10 St Brooklyn 11 NY Marbelite Co Inc 179 N 10 St Brooklyn 11 NY (9)

Marine Electric Co 195 Fremont San Francisco Calif (11)
McPhilben Mfg Co Inc 1329 Willoughby Ave Brooklyn 37 NY (5)
Metalcraft Products Co Inc 6225 State Rd Philadelphia 35 Pa (1.3)
Meyer Machine Inc Red Wing Minn (6)
Midwest Lighting Products Co P 0 Box 536 Edgewater Branch Cleveland 7 Ohio (2)
Millerbernd Mfg Co Winsted Minn (5-6)
MiroFlector Co Inc 40 Bayview Ave Inwood LI
NY (2-4)
Mitchell Lighting Div Compco Corp 1800 N

NY (2-4)
Mitchell Lighting Div Compco Corp 1800 N
Spaulding Ave Chicago 47 III (1.2-13)
Modern Swimming Pool Co Inc 1 Holland Ave
White Plains NY (12)
Moldcast Mfg Co 236 South St Newark 5 NJ
(2-13)

Moidcast Mfg Co 236 South St Newark 5 NJ (2-13)

Multi Electric Mfg Inc 4223 W Lake St Chicago 24 III (1-2-4)

Natale Machine & Tool Co 339 Highway #17 Caristadt NJ (2-4)

Nepo Mfg Co 4230 N Sayre Chicago 34 III (2-5)

Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 III (2)

Penetray Corp 615 Front St Toledo 5 Ohio (2)

Penetray Corp 615 Front St Toledo 5 Ohio (2)

Penetray Corp 615 Front St Toledo 5 Ohio (2)

Penetray Corp 615 Hicksylle LI NY (2-4)

NJ (5-13)—ADV PG 106

PFAFF & KENDALL 84 Foundry St Newark 5 NJ (5-13)—ADV PG 106

Philadelphia Electrical & Mfg Co 1200-36 N 31 St Phila 21 Pa (2-5-10-13)

Philips (Oscar) Co 9701 Reading Rd (Box 21)

Cincinnati 15 Ohio (2-10)

Pittsburgh 12 Pa (2-4)

Poject Fixture Mfg Corp 55 Ongley St Rockville Centre NY (4)

Pyle-National Co 1344 N Kostner Ave Chicago 71 (2000-200)

Pyle-National Co 1344 N Kostner Ave Chicago 51 III (2)

QUADRAMGLE MFG CO 32 S Peoria St Chicago 7 III (2-7-13)—ADV PG 123

Rab Electric Mfg Co Inc 605 E 132 St New York S4 NY (2-4)

Ray-0-Vac Co 212 E Washington Ave Madison 10 Wis (9-11-12) Electric Mfg Co 7420 N Lehigh Ave Chicago 48 III (1-2-4-5-6)

Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (2-4)

Rostan Corp 5660 59th St Maspeth 78 LI NY Rostan Corp 5660 59th St Maspeth 78 LI NY (6) Mfg Co 14262 Birwood Ave Detroit 38

(6)
Mich (5)
Ryther Purdy Lumber Co Inc 501 Tiffany St New
York 59 NY (6)
Shaida Mfg Co Inc 156 W Providencia Ave Burbank Calif (2-4)
Simes Co Inc 114 15th Ave College Point LI
NY (5-6-9-11)
Simes Sinnal Mfg Co 65 Passaic Ave Kearny NJ

Signal Mfg Co 65 Passaic Ave Kearny NJ (3-4) Noot-Holman Co 321 N Eucalyptus Ave (P 0 Box 4097) Inglewood Calif (2) Solar Light Mfg Co 400 North Ashland Chicago 22 III (2)

Solar Light way 60 900 of the Assault Charles 111 (2)
Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (2-4)
Stabrite Fluorescent Mfg Co 3550 Northwest 49
St Miami Fla (2)
Steber Div Pyle-National Co 2700 Roosevelt Rd Broadview 111 (2-4)
Stenner Industries Winsted 1 Minn (2)
Stenner Industries Winsted 1 Stenner Ave Kenilworth NJ (1-2-4-7-8-10-111-12-13-14)
Sunbeam Lighting Co 777 E 14th Pl Los Angeles 21 Calif (5)
Swivelier Co Inc Nanuet NY (2-4)
Thompson Electric Co P O Box 873 Cleveland 22 Ohio (5)

Thompson Electric Co P O Box 873 Cleveland 22
Ohio (5)
Tod-Lite mo 3401 N W 10 St Oklahoma City
OHION METAL MFG CO 1432 Maple Ave N E
Canton 5 Ohio (6)—ADV PG 119
Utilities Service Co 1 Pine St Allentown Pa (5)

Wallace & Tiernan Inc 25 Main St Belleville NJ (1-11-14) NJ (1-11-14)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (4-6-10-11-12-13)
Westinghouse Electric Corp Lighting Div 1216
W 58th (P 0 Drawer 5817) Cleveland 1 Ohio
(1-2-5)

(1-2-5)
WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1 thru 5)—ADV PG 2nd Cover
Wheeler Reflector Co 275 Congress St Boston 10 Wheeler Reflector Co 275 Congress St Boston 10 Mass (2-5) Wide-Lite Corp P O Box 191 Houston 1 Tex (2-13)

Wiley (R&W) Inc. Dearborn & Bridge St. Buffalo 7 NY (4) Moodward Machine Co. Lighting Div. 4833 Elm-hurst. Detroit 4 Mich (2) Mork-O-Lite 522 Cortlandt St. Belleville 9 NJ

#### 9E. PORTABLE LIGHTING EQUIPMENT

1. Machine & bench lights
2. Extension cord & lamp
3. Extension cord & lamp with transformer
4. Reel-type extension lamp
5. Emergency lights
7. Trouble light handles & guards
8. Explosion-proof hand lamps
9. Vaporproof hand lamps
10. Rechargeable hand lamps
11. Mobile working lights

For portable lamps for residential use see "Residential Lighting."

ADJUSTABLE FIXTURE CO 104 E Mason St Milwaukee 2 Wis (1)—ADV PG 110
Aero-Motive Mfg Co 1803 Alcott St Kalamazoo 24 Mich (4-6)
Arco Mfg Co 1701 13th Ave North (Bok 817)
Grand Forks ND (1)
Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)
Benjamin Electric Mfg Co Northwest Highway & Seegers Rd Des Plaines III (1-2)
Benjamin Reel Products Inc 10700 Broadway Cleveland 25 Ohio (7)
Burton Mfg Co 2520 Colorado Ave Santa Monica Calif (1)
Carpenter Mfg Co 2250 Gilman Square Somerville Calif (1)
Carpenter Mfg Co 2250 Gilman Square Somerville
45 Mass (5)
Columbia Wire & Supply Co 2850 Irving Park Rd
Chicago 18 III (2-3-4)
Commercial Reflector & Mfg Co 3109 Maple Ave
Los Angeles 11 Calif (6)
Compco Corp III (2)
Cordomatic Div Vacuum Cleaner Corp of America
1724 W Indiana Ave Phila 32 Pa (4)
Crouse-Hinds Co Syracuse 1 NY (1-2)
Day-Ray Products Inc 1133 Mission St South
Passadena Calif (2-3)
Dazor Mfg Corp 4481-99 Duncan Ave St Louis 10
Mo (1-6)
Electra Mfg Co 4051 Broadway Kansas City Mo
(5) Ericson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (2-3-4-6-8-9) Ohio (2-3-4-6-9)

Pleso International Corp 3720 N Milwaukee Ave Chicago 41 III (1)
Fostoria Corp N Main St Fostoria Ohio (1)
Fostoria Corp N Main St Fostoria Ohio (1)
Gardner Products Co Div Detroit Industrial Products
Co 15:244 Aubrey Detroit 39 Mich (1)
Industrial Electrical Works Inc 15:90 Chicago St Omaha 2 Neb (4)
Joy Mfg Co Electrical Products Div 1201 Mack-Ind Ave St Louis 10 Mo (2-3)
Joy Mfg Co H W Oliver Bldg Pittsburgh 22 Pa (2-3)
Koch & Lowy Inc 201 E 34 St New York 16

Koch & Lowy Inc 201 E 34 St New York 16 NY (4) NY (4)

NY (4)

NY (4)

NY (4)

Koehler Mfg Co 395 Lincoln St Mariboro Mass (5)

McGill Mfg Co Inc Valparaiso Ind (2)

Michigan Fluorescent Light Div 393 Orchard Lake Ave Pontiac Mich (1)

Murray (D A) Co Inc 632 N Mill St Tipton Ind (2)

Natale Machine & Tool Co 339 Highway #17

Carlstadt NJ (2)

Project Fixture Mfg Corp 55 Ongley St Rockville Centre NY (2)

Pyle-National Co 1344 N Kostner Ave Chicago 51

Ill (2)

Royal Electric Corp 95 Grand Ave Pawtucket RI (2)

Sirgno Signal Mfg Co 65 Passaic Ave Kasana All Sireno Signal Mfg Co 65 Passaic Ave Kearny NJ (5) (5)
Standard Portable Cord Co Inc Mayville NY (1-2)
Stocker & Yale Inc Green St Marblehead Mass
(1-23-6)
Stonco Electric Products Co 333 Monroe Ave
Kenilworth NJ (2)
Sun-Lite Mfg Co 2555 Bellevue Ave Detroit 7
Mich (1)
Surrette Storage Battery Co Inc Jefferson Ave
Salem Mass (5)
Swivelier Co Inc Nanuet NY (1-2)

U-C-Lite Mfg Co 1050 W Hubbard St Chicago 22 III (5-8) Ultra-Violet Products Inc San Gabriel Calif (6) Vinco Mfg Co Inc Main St Holland NY (1) Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (1)

Westinghouse Electric Corp P 0 8ox 2278 Pitts-burgh 30 Pa (1)

\*\*MESTINCHOUSE ELECTRIC SUPPLY CO 3 Gate-way Center (8ox 448) Pittsburgh 30 Pa (1 thru 5)—ADV PG 2nd Cover White (0 C) Sales Co 40 Green St Marblehead Mass (1)

\*Wide-Lite Corp P 0 8ox 191 Houston 1 Tex (11)

\*Woodward (Daniel) Co 15 N Jefferson St Chicago 6 III (2-3-4-6)

\*Woodward Machine Co Lighting Div 4833 Elm-hurst Detroit 4 Mich (1)

#### 9F. GASEOUS DISCHARGE LAMPS

Arc
 Cold cathode
 Fluorescent
 Mercury vapor
 Sodium vapor

Light sources only; fixtures are listed under "Portable Lamps" and "Residential Light-ing."

Ampiex Corp Glen Cove Rd Carle Place Long Island NY (3-4) Champion Lamp Works 330 Lynnway Lynn Mass (3-4) (3-4)
Cold Cathode Lighting Corp 76 S Bayles Ave Port
Washington Ny (2)
Cooper Hewitt Electric Co 720-732 Grand St
Hoboken NJ (3-4)
Duro-Test Corp 2321 Hudson Blvd North Bergen
NJ (2-3-4)

NJ (2-3-4)
General Electric Co Lamp Div Large Lamp Dept
Nela Park Cleveland Ohio (3-4)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (3)—ADV PG 2
Illuminating Engineering Co 2347 East Nine Mile
Rd Hazel Park Mich (2)
Interlectric Div El-Tronics Inc 1401 Lexington Ave
Warren Pa (3)
Luxor Lighting Products Inc 350 5th Ave New

Warren Pa (3)
Luxor Lighting Products Inc 350 5th Ave New York 1 NY (2-3-4)
Marvel Lamp Co 307 Newark St Hoboken NJ (3)
National Cathode Corp 317 E 34 St New York 16 National ( NY (2)

National Cathode Corp 317 E 34 St New York 16 NY (2)

Penetray Corp 615 Front St Toledo 5 Ohio (3-4)

Pollak Luminescent Corp 1105 W Lawrence Ave Chicago 40 III (2)

Radiant Lamp Corp 300 Jelliff Ave Newark 8 NJ (4)

Solar Electric Corp 121 Central Ave Warren Pa (3)

Suclar Laboratories Inc 1197 McCarter Highway Newark NJ (3)

Supro Lux Mfg Co Inc York 51 NY (2-3)

Swedish Iron & Steel Corp 910 Westfield Ave Elizabeth NJ (2)

Sylvania Electric Products Inc 730 Third Ave New York 19 NY (1-2-3)

Voltarc Tubes Inc 44 Cross St Norwalk Conn (2-3)

Voltarc Tubes Inc 44 Cross St Norwalk Conn (2-3)

Westron Corp 652 Hudson St NY 14 NY (2-3-4)

9G. FILAMENT LAMPS

Clear or frosted
 Cofaced
 Cofaced
 Govenness argon)
 Infrared
 Ultra-violet
 Insect repellent
 Miniature
 Reflector flood & PAR
 Sealed beam
 Decorative
 In Outra

9. Sealed brown
10. Decorative
11. Quartz
12. Traffic signal
13. Shock-resistant
14. Series street lighting

Light sources only; fixtures are listed under "Portable Lamps" and "Residential Light-

Aerolux Lights Corp 653 11th Ave New York 36 NY (2-3-5-10) NY (2-3-5-10)

Amplex Corp Glen Cove Rd Carle Place Long Island NY (1-2-4-6-8-9)

Champion Lamp Works 330 Lynnway Lynn Mass (1-2-4-6-8-10)

Chicago Miniature Lamp Works 1500 N Ogden Ave Chicago 10 III (1-2-3-7-9)

Cold Cathode Lighting Corp 76 S Bayles Ave Port Washington NY (5)

Comet Lamp Co 5 E 35 St New York 16 NY (10) Dialight Corp 60 Stewart Ave Brooklyn 37 NY (3-7) G-7)

Orake Mfg Co 4626 N Olcott Harwood Heights
Chicago 31 III (3-7)

Duro-Test Corp 2321 Hudson Blvd North Bergen
NJ (1-2-4-6-8)

Elite Glass Co Inc 111 W 22nd St New York 11
NY (1)

NY (1)
General Electric Co Lamp Div Large Lamp Dept
Nela Park Cleveland Ohio (1 thru 10)
General Electric Co Lamp Div Miniature Lamp
Dept Nela Park Cleveland Ohio (1 thru 10)
GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1 thru 11)—ADV PG
84-85

Ave 84-85 84-85
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1-2)—ADV PG 2
Hudson Lamp Co 528 Elm St Kearny NJ (3-7)
Interlectric Div El-Tronics Inc 1401 Lexington
Ave Warren Pa (1-6-8) Ave Warren Pa (1.6-8)
Luxor Lighting Products Inc 350 5th Ave New
York 1 NY (1.2-4-6-8-9-12-13-14)
Marco Industries 207 S. Helena St. Anaheim
Calif (3-7)
Marve Lamp Co 307 Newark St. Hoboken NJ

Calif (3-7)

Marvel Lamp Co 307 Newark St Hoboken NJ (1-2-4-6-8)

Natale Machine & Tool Co 339 Highway #17 Carlstadt NJ (8)

NORTH AMERICAN ELECTRIC LAMP CO 1520 North 13th St St Louis 6 Mo (2-4-7-10)—ADV PG 128

Northern Incandescent Lamp Co 1 Newark St Hoboken NJ (1-2-4-6)

Penetray Corp 615 Front St Toledo 5 Ohio (1-2-4-5-6-8)

Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio (4)

Radiant Lamp Corp 300 Intiff American

Radiant Lamp Corp 300 Jeliff Ave Newark 8 NJ (1-4-8-9) Signalite Inc 37-41 Neptune Highway Neptune NJ (3) Electric Corp 121 Central Ave Warren Pa (1-2-4-6) Electric Mfg Co Inc 269 Meserole St oklyn 6 NY (1-6-8) Star-A Electric Mfg Co Inc 269 Meserole St Brooklyn 6 NY (1-6-8)
Sylvania Electric Products Inc 730 Third Ave New York 19 NY (1-2-3-4-7-8)
Ultra-Violet Products Inc 5114 Walnut Grove Ave San Gabriel Calif (5)
Weiss & Bihelier Merchandise Corp 40 W 20 St New York 11 NY (10)
Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (10-11)
Westinghouse Electric Corp Lamp Div Bloomfield NJ (1 thru 9)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa (1-2)
—ADV PG 2nd Cover
Westron Corp 652 Hudson St NY 14 NY (1-2-6-8-10)

9H. LIGHTING SYSTEM ACCESSORIES

Reflectors
 Louvers & diffusers
 Glassware
 Panels
 T-bars & supports
 Gimbal rings

For use with suitable sockets or fixtures or for area and ceiling lighting systems.

Abolite Lighting Div Jones Metal Products Co West Lafayette Ohio (1-2)
Abrams Lighting 785 Schuykill Ave Philadeiphia
46 Pa (1)
Acme Lighting & Mfg Co 949 E 31 St Los
Angeles 11 Calif (1)
Afco Lite Corp 1378 N Wolcott Chicago 22 III Alexander-Tagg Industries Inc Jacksonville Road at Summit Ave Hatboro Pa (6) All-Brite Light Co 400 S 12 St Reading Pa

(1)

AMERICAN LOUVER CO 53 N Elston Ave Chicago 30 III (2)—ADV PG 101

Artcraft Lighting Co Inc 248 McKibben St Brooklyn 6 NY (1)

B M D & R Inc 7020 Walker St St Louis Park Mineapolis 16 Minn (1)

Benjamin Div Thomas Industries Inc 207 E Broadway Louisville 2 Ky (1)

Canning-Pekara Inc 2144 N Wood St Chicago 14 III (1-2)

Capitol Stage Lighting Co Inc 527 W 45 Chicago 14 Capitol Stage Lighting Co Inc 527 W 45 St New York 36 NY (1) Ceiling Materials Co 200 Waring Rd Memphis 17 Tenn (5) Tenn (5)
Cold Cathode Lighting Corp 76 S Bayles Ave Port
Washington NY (1)
Cole (C W) & Co Inc P O Box 3382 Los Angeles
54 Calif (1)
Columbia Electric & Mig Co North 2310 Fancher
Way Spokane Wash (2)
Compoc Corp 1800 N Spaulding Ave Chicago 47
III (1)
Corning Glass Works Corning NY (3-4)
Crownlite Fluorescent Co 7 Roselle St Mineola
NY (1)
Curtis Lighting Div Curtis-All Brite Lighting Inc.

urtis Lighting Div Curtis-All Brite Lighting Inc 6135 W 65 St Chicago 38 III (1)

Cutler Light Mfg Co 2026 N 22 St Phila 21 Pa (1)

Derrick Light & Equipment Co 1201 E Daggett (P O Box 414) Fort Worth Tex (1)

Electro Lighting Corp 1536 S Paulina St Chicago 8 III (1)

Erie Glass Mfg Co 564 Union Trust Bldg Pittsburgh 19 Pa (3)

Fannon (John J) Products Co 3000 E Woodbridge Detroit 7 Mich (4)

Frink Corp 211 6376 St Brooklyn 20 NY (1-2)

General Lighting Co 248 McKibbin St Brooklyn 6 NY (1)

Great Northern Mfg Corp 1056 N Wood St Chicago 22 III (1)

Gruber Bros Inc 125 South First St Brooklyn 11 NY (1)

Guth (Edwin F) Co 2615 Washington Bivd St Louis 3 Mo (1-2)

Hall (William) Co Canal Bank Windsor Locks Conn (5)

Hexcel Products Inc 2332 4th St Berkeley 10 Conn (5)
Hexcel Products Inc 2332 4th St Berkeley 10
Calif (2) Calif (2)

NV (1-3)

NV (1-3)

NV (1-3)

August (1-2)

So Industries 600 E Turner St Los Angeles 12

Calif (4)

Jackson Electrical Co 900 W Van Buren St Chicago 7

Joleco Corp 2513 Baldwin St St Louis 6 Mo (1-2) (1-2)

Joleco Corp 2513 Baldwin St St Louis 6 Mo (1-2)
K-B Lighting Mfg Co 2101 Byberry Rd Phila 16 Pa (1)
Keystone Electric Mfg Co 2228 E Tioga St Phila 34 Pa (1)

SILLLARK ELECTRIC MFG CO 3940 Easton Ave St Louis 13 Mo (1)—ADV PG 78-79

Kliegi Bros Universal Electric Stage Lighting Co Inc 321 W 50 St NY 19 NY (1)
Kurtzon (Morris) Inc 1420 S Talman Ave Chicago B III (1)
L R P Lighting Box 157 Olive Branch Miss (1)
Lancaster Glass Corp Lancaster Ohio (3)
Lee-Bert Inc 900 Lapeer St Saginaw Mich (4)
Lightonics P D Box 7211 Oakland 1 Calif (2-4)
Line Material Industries McGraw-Edison Co 700

W Michigan St Milwaukee Wis (1)
McKee Div Thatcher Glass Mfg Co Inc Jeannette
Pa (3)
Mid-West Chandelier Co 15th & Gentry (P O Box 7365) North Kansas City 16 Mo (3)
Midwest Lighting Products Co P O Box 5365
Edgewater Branch Cleveland 7 Ohio (1)
Miller Co Illuminating Div 99 Center St Meriden Conn (1-2)
MiroFlector Co Inc 40 Bayview Ave Inwood LI Miller Co III Conn (1-2) MiroFlector C iroFlector Co Inc 40 Bayview Ave Inwood LI NY (1)

Modern Light Co Inc. 7809 Maplewood Industrial Court St Louis 17 Mo (1) Multi Electric Mfg Inc. 4223 W Lake St Chicago 24 III (1) Mational Cathode Corp. 317 E 34 St New York 16 NY (1) Overhagh & August Mfg Co. Co. 2016 National Cathode Corp 317 E 34 St New York
16 NY (1)
Overbagh & Ayres Mfg Co 411 S Clinton St Chicago 7 III (1)
Pittsburgh Reflector Co Oliver Bldg Mellon Square
Pittsburgh 22 Pa (1)
POWER-STRUT DIV VAN HUFFEL PRODUCTS
INC Dietz Rd Warren Ohio (5)—ADV PG 93
Quadrangle Mfg Co 32 S Peoria St Chicago 7
III (1)
Rab Electric Mfg Co Inc 605 E 132 St New
York 54 NY (1)
Ruby-Philite Corp 32-02 Queens Blvd LIC 1 NY
(1-2)
Russell & Stoll Co Inc 125 Rarciay St

(1-2) Sevent Series Series Series Series Series (1-2) Russell & Stoll Co Inc 125 Barclay St NY 7 NY (1)

Spero Electric Corp 20500 St Clair Ave Cleveland 17 Ohio (1)

Stabrite Fluorescent Mfg Co 3550 Northwest 49 St Miam Fla (1)

Standard Portable Cord Co Inc Maywille NY (1)

Steber Div Pyle-National Co 2700 Roosevelt Rd Broadview III (1)

Supreme Lighting Co 600 E Turner St Los Angeles Calif (4)

Swivelier Co Inc Nanuet NY (1)

United Lighting & Ceiling Co 2828 Ford St Oak-

United Lighting & Ceiling Co 2828 Ford St Oak-land 1 Calif (2-4-5) Versen (Kurt) Co 4 Slocum Ave Englewood NJ (1-2)

(1-2)
Weiss & Biheller Merchandise Corp 40 W 20 St
New York 11 NY (3)
Westinghouse Electric Corp Lighting Div 1216
W 58th St (P 0 Drawer 5817) Cleveland 1
Ohio (1)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa
Yorkville Metal Products Co 627 Greenwich St
New York 14 NY (1)

#### 9J. MISCELLANEOUS LIGHT SOURCES

## Radioisotope excited Electroluminescent panels

Sylvania Electric Products Inc 730 Third Ave New York 19 NY (2) United States Radium Corp town NJ (2) Westinghouse Electric Corp P O Box 2278 Pitts-burgh 30 Pa (2) Westinghouse Electric Corp Lamp Div Bloomfield Westingho NY (2)

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

*Code No.	Description, Pages Catalog No. & Mfr.
9-1	Lighting Equipment; 40p (Afco Lite)
9-2	Shallow Line Troffers; 52p; Cat. Sec. A (Benjamin)
9-3	Lumi-flo Troffers; 44p; Cat. Sec. B (Ben- jamin)
9-4	Commercial Fluorescent Lighting; 20p; Cat. Sec. C (Benjamin)
9-5	Sky-Glo Illuminated Ceilings; 20p; Cat. Sec. D (Benjamin)
9-6	Industrial Fluorescent Lighting; 20 p; Cat. Sec. F (Benjamin)
9-7	Industrial Incandescent Lighting; 32p; Cat. Sec. G (Benjamin)
9-8	Protected Lighting; 20p; Cat. Sec. I (Ben- jamin)
9-9	Floodlighting; 24 p; Cat. Sec. J (Benjamin)
9-10	Commercial Lighting; 20p; Cat. No. 18 (Capitol)
9-11	Stage Lighting Apparatus; 49p; Cat. No. 31-F-25

9-12	Pilot Lights; 23p; Cat. No. L-161-B (Dia- light)
9-13	Incandescent Lighting Fixtures; 19p; Cat. No. G-2 (Gill)
9-14	Engineered Lighting and Control Equip- ment; 44p; Cat. No. 101 (Hub)
9-15	Fluorescent Lighting Fixtures; 44p (Joleco)
9-16	Architectural Lighting Data; 34p (Kent)
9-17	Seamless Round Taped Aluminum Lighting Standards; 23p (Kerrigan)
9-18	Octagonal Lighting Standards; 41p (Kerrigan)
9-19	Traffic Signal Standards; 13p (Kerrigan)
9-20	Street Lighting; 19p (Kerrigan)
9-21	Brackets and Mast Arms; 13p (Kerrigan)
9-22	Television Lighting; 28p; Cat. No. TV-6 (Kliegl)
9-23	Theatrical Lighting; 83p; Cat. No. T-61 (Kliegl)
9-24	Architectural Lighting; 35p; Cat. No. A-11 (Kliegl)
9-25	Safety & Signal Lanterns; 19p; Cat. No. 586 (Larco)
9-26	Lighting Equipment; 62p (Magni-Flood)
9-27	Lighting Fixtures; 28p (Meierjohan-Weng- ler)
9-28	Versaline and Aluminum Troffers; 26p (Miller)

<b>a</b> -	9-29	Commercial Fluorescent Luminaires; 36p (Miller)
t.	9-30	Industrial Fluorescent Luminaires; 12p (Miller)
p-	9-31	Industrial Lighting Equipment; 38p (Miller)
0)	9-32	Lighting Equipment; 59p; Cat. No. M-165 (Moe Light)
ng	9-33	Circle D Lights; 12p; Cat. No. 2 58-20 (Natale)
	9-34	Engineered Incandescent Lighting; 71p; Cat. No. 956 (Perfeclite)
4-	9-35	Contemporary Lighting; 16p; Cat. No. 59-C (Perfectite)
	9-36	Lighting Fixtures; 12p; Cat. No. L-58 (Perfect-Line)
	9-37	Boxes and Fittings; 10p; Cat. Sec. E (Stonco)
-6	9-38	Vaportight Lighting; 12p; Cat. Sec. F (Stonco)
51	9-39	Underwater Lighting; 10p; Cat. Sec. G (Stonco)
11	9-40	Sealed Beam Lighting; 44p; Cat. Sec. B (Stonco)
0.	9-41	Emergency Portable Lighting; 10p; Cat. Sec. H (Stonco)
	9-42	Decorative Architectural Lighting; 16p; Cat. Sec. A (Stonco)
g-	9-43	Incandescent Lighting; 22p; Cat. No. 611

9-44 Lighting Equipment; 33p (Wakefield)

### SECTION 10. SIGNAL, COMMUNICATING & INDICATING EQUIPMENT

Many of the indicating devices listed below are closely related to industrial processing controls listed in Section 3.

### 10A. METERS

Ammeters, voltmeters & volt-ammeters
 Kva meters
 Light meters
 Demand meters
 Fluxmeters
 Galvanometers
 Kilowatt-hour meters
 Ohmmeters
 Recording-type meters

8. Ohmmeters
9. Recording-type meters
10. Power factor meters
11. Tachometers
12. Varmeters
13. Wattmeters
14. Phase angle meters
15. Electrolysis meters
16. Frequency meters
17. Electrostotic meters
19. Watto on meters
19. High-voltage test meters
20. Potentiometers
21. Clamp-on (snap-around) meters
22. Potential devices

Aero Instrument Co 11423 Vanowen St North Hollywood Calif (16)
Airserco Mfg Co Inc 435 Melwood St Pittsburgh 13 Pa (1)
Allen Electric and Equipment Co 2101-2117 N Pitcher St Kalamazoo Mich (1-11)
Amprobe Instrument Corp 630 Merrick Rd Lynbrook NY (1-9-21)
Anchor Mfg Co P O Box 959 Manchester NH (22) Assembly Products Inc Chesterland 31 Ohio (1)
Associated Research Inc 3789 W Belmont Ave
Chicago 18 III (11)
Bede Electrical Instrument Co Inc Penacook NH

trical Instrument Co Inc Penacook NH ergen Laboratories Inc 60 Spruce St Paterson 1 NJ (1-8) NJ (1-8) ddle (James G) Co 1316 Arch St Phila 7 Pa (2-6-8-11-16)

Bliss Electronic Corp Sussex NJ (1-8-27)
Bodendieck Tool Co P O Box 499 Taylorville III
(19)

(19)
Borden Engineering Div M J Johnson Aircraft
Engineering Co Box 10 Morristown N. (6)
Burton-Rogers Co 42 Carleton St Cambridge 42
Mass (1)

Mass (I)
Collimbia Electric MFG C0 4519 Hamilton
Ave Cleveland 14 Ohio (1)—ADV PG 118
Continental-Wirt Electronics Corp 26 W Queen
Lane Philadelphia 44 Pa (20)
Cutler-Hammer Inc 228 N 12 St Milwaukee 1
Wis (9)
Davenport Mfg Div Duncan Electric Co Inc 2532
N Elston Ave Chicago 47 III (1-8)
Davis Electric Co 28 Parker St Wallingford
Conn (8) **COLUMBIA** 

Conn (B) Daystrom Inc Weston Instruments Div 814 Fre-linghuysen Ave Newark 12 NJ (1-2-5-6-8-10-11-13)

11-13)
DeJur-Amsco Corp 4501 Northern Blvd Long
Island City 1 NY (1-9)
Duncan Electric Mfg Co Lafayette Ind (4-7)
Durant Mfg Co 1900 N Buffum St Milwaukee 1
Wis (11)

Eastern Specialty Co 3617 N 8th St Phila 40 Pa (8-14-22)

Pa (8-14-22)
Electric Re-Light Co Uniman Pl at S Goodman Rochester 20 NY (7)
Electric Tachometer Corp 68th & Upland Sts Phila 42 Pa (1)
Electro-Mechanical Instrument Co 8th & Chestnut Sts Perkasie Pa (1)
Electro-Mechanic Co 241 E Erie St (EM) Milwaukee 2 Wis (11)
EPCC Electronics Inc 140 Liberty St NY 6 NY (1-8)
Erwood Inc 1770 Restaut August 1

Erwood Inc 1770 Berteau Ave Chicago 13 III

(18)

Esterline-Angus Instrument Co P O Box 596 Indianpolis 6 Ind (1-9-10-11-12-13-16)

Fleron (M M) & Son 1220 Yardley Rd Morrisville Pa (8)

General Controls Co Boll Allen Ave Glendale Calif (9)

General Electric Co Apparatus Sales Schenectally 5 NV (1-4 thru 16)

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave Bridgeport Conn (1-2-4-7 thru 10-13)—ADV PG 84-85

General Radio Co West Concord Mass (8-11)

Gray Instrument Co Mill Rd Audalusia Pa (9)

GRAYBAR ELECTRIC CO INC 420 Lexingston Ave

Gray Instrument Co Mill Rd Audalusia Pa (9)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1)—ADV PG 2
Greibach Instruments Corp 315 North Ave New
Rochelle NY (1-8)

Hewson Co Inc 115 Maple St Summit NJ (8) Hickok Electrical Instrument Co 10614 Dupont Ave Cleveland 8 Ohio (1-2-4-5-6-8-10-12-13-14-16)

Holtzer-Cabot Div National Pneumatic Co Inc 125 Amory St Boston 19 Mass (8) Howell Instruments Inc 3479 W Vickery Blvd Fort Worth 7 Tex (1-2-6-8-9-16)

rort worth 7 Tex (1-2-6-8-9-16)
Hoyt Electrical Instrument Works 42 Carleton St Cambridge 42 Mass (1)
Ideal Industries Inc 5136 Park Ave Sycamore III (11)

III (11)
Industrial Devices Inc Edgewater 19 NJ (1)
Industrial Instruments Inc 89 Commerce Rd Cedar
Grove NJ (2-8)
Industrial Transformer Corp Gouldsboro Pa (8)
Jones Motrola Corp 432 Fairfield Ave Stamford
Conn (11)

Conn (11)

Kay Electric Co Maple Ave Pine Brook NJ (1)

Kin Tel Div Cohu Electronics Inc 5725 Kearney

Villa Rd San Diego 12 Calif (1-6)

Knopp Inc 1307 66th St Oakland 8 Calif (17)

Leds & Northrup Co 4970 Stenton Ave Phila

en ra (b-63-9) Leitch-Huard Corp Stark & Commercial Sts Man-chester NH (1) Lewis Engineering Co 52 Rubber Ave Naugatuck Conn (9)

Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (1) Marion Instrument Div Minneapolis-Honeywell Regu-lator Co Grenier Field Manchester NH (1-22) Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-11-13)

Meters Inc 5353 N Keystone Ave Indianapolis 20 Ind (1-2-8)

Metron Instrument Co 432 Lincoln St Denver 3 Colo (11) 3 Loro (1.1)
Minneapolis-Honeywell Regulator Co Boston Div
40 Life St Boston 35 Mass (6)
Minneapolis-Honeywell Regulator Co
Wayne & Windrim Aves Phila 44 Pa (1-4-6-910-11-12-13)

Partlow Corp 230 Campion Rd New Hartford NY (9)

Peschel Electronics Inc RFD #1 Patterson NY (8) Radio Frequency Laboratories Inc Boonton NJ
(22)

Rattray (George) & Co Inc 101 New South Rd Hicksville NY (9) S & C Electric Co 4435 Ravenswood Ave Chicago 40 III (22)

Sangamo Electric Co 11th & Converse Spring-field III (1-2-4-7-9-12-13) Sensitive Research Instrument Corp 310 Main St New Rochelle NY (1-5-6-10-13-16-20) Shalicross Mfg Co Preston St Selma NC (2-6-8-9-15) 310 Main St 8-9-15)
Shurite Meters 130 Wallace St New Haven 8
Conn (1)
Simpson Electric Co 5200 W Kinzie St Chicago
44 III (1-6-8-13)
Snap-On-Tools Corp 8028 28th Ave Kenosha Wis
(11-21) Snap-On-1 (11-21) Westheimer (P 0 Box 22187) Houston 27 (1-6-8-11) (1-6-6-11)
Standard Electric Time Co 89 Logan St Spring-field 2 Mass (11)
States Co 19 New Park Ave Hartford 6 Conn (22) Sticht (Herman H) Co Inc. 27 Park Place New York 7 NY (1-8-11-16) Technology Instrument Corp 531 Main St Acton Mass (14) Mass (14)

Trio Laboratories Inc Expressway Industrial Park
Plainview NY (1-14)

Triplett Electrical Instrument Co 286 Harmon Rd
Bluffton Ohio (1-2-8-13)

U S Gauge Div American Machine & Metals Inc
Clymer Ave Sellersville Pa (1)

Wac Line Inc 35 S St Clair St Dayton 2 Ohio
(1-11-16) Weksler Instrument Corp 195 E Merrick Rd Freeport LI NY (9)
Western Electro-Mechanical Co Inc 300 Broadway
Oakland 7 Calif (1-10-14)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (1-2-4-6 thru 14-16)

WESTINCHOUSE ELECTRIC SUPPLY CO 3 Gate
way Center (Box 448) Pittsburgh 30 Pa (1-4)
—ADV PG 2nd Cover
Yokogawa Electric Works Inc 40 Worth St New
York 13 NY (1-11-13)
Zernickow (0) Co 15 Park Row New York 38
NY (11)

#### 10B. INDICATORS & ALARMS

1. Annunciators
2. Bin level
3. Blown fuse
4. Revolution
5. Current failure
6. Fault & ground
7. Photoelectric
8. Liquid level
9. Peak load
10. Phate sequence
11. Smake
12. Synchroscopes
13. Temperature
14. Lamp failure
15. Sound level
16. Liquid-flow
17. Counting devices
18. Sprinkler alarms
19. Elapsed time
20. Fire alarm detectors

#### For associated controls, see "Control Switches" in Section 3. "Controls" &

Abrams Instrument Corp 606 E Shiawasee St Lansing Mich (17)

Acoustica Associates Inc 10400 Aviation Blvd Los Angeles 45 Calif (8)

Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (1-6)

American District Telegraph Co 155 Sixth Ave New York 13 NY (11-18-20)

American Sentry Inc 84 Bethiehem Pike Philadelphia 18 Pa (7-11-13)

Assembly Products Inc Chesterland 31 Ohio (13)

Associate Reseach Inc 3789 W Belmont Ave Chicago 18 III (10)

Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-6)

AUTOCALL CO 58 Warden Ave Shelby Ohio (1-6)

AUTOCALL CO 58 Warden Ave Shelby Ohio (1-17)—ADV PG 110

Automatic Control Co 995 University Ave St Paul 4 Minn (1-5-8-13)

Automatic Devices Div American Machine & Metals Inc Sellersville Pa (13)

Automatic Timing & Control Sinc King of Prussia Pa (2-4-8-17-19)

Automatic Timing & Control Sinc King of Prussia Pa (2-4-8-17-19) ra 12-4-0-17-17) Automation Products Inc 3030 Max Roy St Hous-ton 24 Tex (8) B/W Controller Corp 2200 E Maple Rd Birming-ham Mich (8) ham Mich (8)
Bailey Meter Co 1050 Ivanhoe Rd Cleveland 10
Ohio (8-11-13) Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (19) Biddle (James G) Co 1316 Arch St Phila 7
Pa (6) Pa (6)
Bin-Dicator Co 13946-212 Kercheval Ave Detroit 15 Mich (2-8)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (8-13)

Borden Engineering Div M J Johnson Aircraft Engineering Co Box 10 Morristown NJ (6)

Brundee Co 48 Hale St Cranford NJ (6)
Brunswick Instruments P 0 Box 813 New Brunswick NJ (10) Burling Inst Instrument Co Inc 16 River Rd Chatham NJ (13)
Central Station Signals Inc 53 W 23 St New York 10 NY (5-8-11-13)
Clark Controller Co 1146 E 152 St Cleveland 10 Ohio (9-11)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan Hole (17)
Coreal Inc P 0 Box 9671 Pittsburgh 16 Pa (2)
Couch (S H) Co Inc 3 Arlington St North Quincy
71 Mass (1)
Counter & Control Corp 4503 W Brown Deer Rd
Milwaukee 23 Wis (4-17)
Crouse-Hinds Co Syracuse 1 NY (6-8)
Cutler-Hammer Inc 228 N 12 St Milwaukee 1
Wis (7-8-13) Criticr-Mammer Inc. 228 N 12 St. Miliwaukee 1
Wis (7-8-13)
Davenport Mfg Div Duncan Electric Co Inc. 2532
N Elston Ave. Chicago 47 III (6-10)
Daystrom Inc. Weston Instruments Div. 614 Freiinghuysen Ave. Newark 12 NJ (13)
Designers for Industry Inc. 4241 Fulton Pkwy
Cleveland 9 Ohio (13-19-20)
Dietz (Henry G) Co Inc. 12-16 Astoria Blvd Long
Island City 2 NY (8)
Durant Mfg Co 1900 N Buffum St. Milwaukee 1
Wis (17)
Dwyer (F W) Mfg Co. Woodland at Greenwood Wis (Ar)
Wyer (F W) Mfg Co Woodland at Greenwood
(P O Box 373) Michigan City Ind (8)
Eastern Specialty Co 3617 N 8th St Phila 40
Pa (10) Pa (10)
Edwards Co Inc Norwalk Conn (1-20)
Electric Tachometer Corp 68th & Upland Sts
Phila 42 Pa (4)
Electro Devices Inc 4648 Easton Ave St Louis
13 Mo (1) 1.3 Mg (L) Electro-Mechanical Instrument Co 8th & Chestnut Sts Perkasie Pa (5) Electronic Control Corp 15341 Dale Detroit 23 Mich (7-11) Mich (7-11)

Electronics Corp of America One Memorial Dr Cambridge Mass (7-8-11)

Ellenco Inc 3322 M St N W Washington 7 DC (1-6-11-13)

Excel Electric Service Co Inc 2113 S Western Ave Chicago B III (6)

Faraday Inc 2011 W Beecher Rd Adrian Mich (1) (1)
Inc Pleasant St. Ashland Mass (13)
scher & Porter Co. 335 Warminster Rd. Hatt
Pa. (1-7-8-13-16) Fenwal Inc Hatboro Pa (1-7-8-13-16)
Fisher Research Laboratory Inc 1961 University
Ave Palo Aito Calif (8)
General Controls Co 801 Allen Ave Glendale Calif
(4-8-13)
General Electric Co Apparatus Sales Schenectady
5 NY (4 thru 13)
Glo-Lite Instrument Co 152 Watson Ave Newark
12 NJ (6-10)
Globe Industries Inc 1784 Staplay Ave Davids A Globe Industries Inc 1784 Stanley Ave Dayton 4
Ohio (17-19) Onio (17-19)
Haledy Electronics Co 57 William St NY 5 NY
(7-8-16-17)
Healy-Ruff Co Water Level Controls Div 2255
University Ave St Paul 14 Minn (8)
Heat-Timer Corp 657 Broadway New York 12
NY (13) Hewitt-Robins 666 Glenbrook Rd Stamford Conn (2) (2)
Hewson Co Inc 443 Broad St Newark 2 NJ (6)
Hickok Electrical Instrument Co 10614 Dupont
Ave Cleveland 8 Ohio (13)
Howell Instruments Inc 3479 W Vickery Blvd
Fort Worth 7 Tex (13) Fort Worth 7 Tex (13)
Hughey & Phillips Inc 3200 North San Fernando
Blvd Burbank Calif (14)
Illinois Testing Laboratories Inc 420 N LaSalle St
Chicago 10 III (13)
Industrial Devices Inc Edgewater 19 NJ (3)
Industrial Instruments Inc 89 Commerce Rd Cedar
Grove NJ (2)
Instrument Laboratories 315 W Walton PI Chicago
10 III (6)
Jeffrey Mfg Co 832 N 4 St Columbus 16 Ohio
(2) (2) (2) Jordan Co Inc. 3235 West Hampton Ave Milwaukee 9 Wis (7) Kidde Ultrasonic & Detection Alarms Dlv Walter Kidde & Co Inc. 459 Brighton Rd Clifton NJ (7-13) Kirkland (H R) Co 8 King St Morristown NJ (1) Knopp Inc 1307 66th St Oakland 8 Calif (10) Kurman Electric Co 191-193 Newel St Brooklyn 22 NY (7) Larson Instrument Co 24 Orchard St Tarrytown NY (5-13) Leeds & Northrup Co 4970 See Pa (6-11-13)

Magnetrol Inc 2110 S Marshail Blvd Chicago 23 Pa 10-32-Magnetro Inc 2110 S Marshall on III (8) Manning Maxwell & Moore Inc 250 E Main St Stratford Conn (8-13) Marsh (Jas P) Crop 3501 Howard St Skokie III (13)
McDonnell & Miller Inc 3500 N Spaulding Ave
Chicago 18 III (8)
Mercoid Corp 4201 W Belmont Ave Chicago 41
III (13)

O'Brien Electric Corp 6514 Santa Monica Blwd Hollywood 38 Calif (1) Opad Electric Co 43 Walker St. New York 13 NY (6-10) Panalarm Div Panellit Inc 7401 N Hamlin Ave Skokie III (1) Panellit D Div ISI Inc 7401 N Hamlin Ave Skokie Parr Mfg Corp 48 Hale St Cranford NJ (6)
Partrick & Wilkins Co 51 N Seventh St Phila 6
Pa (1) Peschel Electronics Inc RFD #1 Patterson NV (5-6) Photobell Co Inc 43 Vesey St New York 7 NY (8-11) Photomation Inc 96 S Washington Ave Bergenfield NJ (2-4-7-11-16) Portable Light Co Inc 65 Passaic Ave Kearny NJ (7) NJ (7)
Post Electronic Products 12 Lothrop St Beverly
Mass (17)
Pyrometer Instrument Co Bergenfield NJ (13)
Russell & Stoll Co Inc 125 Barclay St NY 7
NY (6)
Scam Instrument Corp 3101 N Lowell Ave Chicago 41 III (1)
Cott (H H) Inc 111 Powder Mill Rd Maynard
Mass (15)
Scrayco Mfg Co 201 Greene Ave Middlesex NJ (2)
(2)
Sell (H H) Electric Co 3240 Dakota Ave Minne-(2)
Sell (H H) Electric Co 3240 Dakota Ave Minneapolis 16 Minn (10)
Shallcross Mfg Co Preston St Selma NC (6)
Simmonds Precision Products Inc Tarrytown NY
(8) (8)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (1-4)
Stewart Brso Div Instrument Laboratories 315 W
Walton Pl Chicago 10 III (6)
Sticht (Herman H) Co Inc 27 Park Place New
York 7 NY (10-19)
Superior Interlock Corp 73-39 Central Ave Glendale 27 NY (1) Juperior Interiock Corp 73-39 Central Ave Glendale 27 NY (1) Tigerman Engineering Co 4332 N Western Ave Chicago 18 III (1) Tobe Peutschmann Corp Providence Highway Norwood Mass (6) Trimourt Instrument Div General Controls Co 8080 McCormick Blvd Skokie III (8) United Mfg Div W L Masson Corp 41 Halg St Hamden 14 Cann (10) U S Gauge Div American Machine & Metals Inc Clymer Ave Sellersville Pa (13) Veeder-Root Inc 70 Sargeant St Hartford 2 Conn (17) Vemaline Products Co 533 Conservations of the Conservation of the Conservati Vemaline Products Co 511 Commerce St Frank-lin Lake NJ (17) Viking Instruments Inc East Haddam Conn (1-8.13) 8-13) Walkirt Co 141 W Hazel St Inglewood 3 Calif (17) Wallace & Tiernan Inc 25 Main St Belleville NJ (7-8) Warrick (Chas F) Co 1964 W Eleven Miles Rd Berkley Mich (8)
Weksier Instruments Corp 195 E Merrick Rd Freeport L NY (13)
West Instrument Corp 4363 W Montrose Ave Chicago 41 III (13)
Wester Instrument Corp 4363 W Montrose Ave Chicago 41 III (13)
Western Electro-Mechanical Co Inc 300 Broadway Oakland 7 Calif (10)
Westinghous Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-6-7-8)
White-Rodgers Co 9797 Reavis Rd St Louis 23 Mo (13)
Yellow Springs Instrument Co Inc P 0 Box 230 Yellow Springs Instrument Co Inc. P 0 Box 106 Yellow Springs Ohio (13)

#### 10C. TESTERS & LOCATORS

1. Growlers
2. Circuit analyzers
3. Protective device analyzers
4. Magnetos.
5. Dynamometers
6. Continuity testers
7. Fluorescent unit testers
9. Turns-ratio testers
10. Polarity testers
11. Cable, metal & outlet locators
12. Cable fault locators
13. Voltage testers
15. Bridges
16. Ground resistance testers
16. Ground resistance testers
17. Strobocopes
18. Oscilloscopes
19. Relay testers Oscilloscopes Relay testers Corona testers Dielectric tester 21. Delectric testers
22. Low-resistance testers
23. Neon tusters
24. System analyzers
25. Motor analyzers
26. Contact resistance testers
27. Capacitor aging testers
28. Cable tracers

Minneapolis-Honeywell Regulator Co Ave S Minneapolis 8 Minn (4)
Minneapolis-Honeywell Regulator Co Industrial Div Wayne & Windrim Aves Phila 44 Pa (7-8-13)
Nelson Electric Mfg Co P O Box 5365 Tulsa
Okla (6)

New Jersey Meter Co Inc 350 Leland Ave Plain-field NJ (16)

Airserco Mfg Co Inc 435 Melwood St. Pittsburgh 13 Pa (2) Allen Electric and Equipment Co 2101-2117 N Pitcher St Kalamazoo Mich (25) Amprobe Instrument Corp 630 Merrick Rd Lyn-brook NY (28)

brook NY (28)
Associated Research Inc 3789 W Beimont Ave Chicago 18 III (8-12-16-20)
Berkshire Laboratories 942 Bank Village Greenville NH (17)

BIDDLE JAMES 6) CO 1316 Arch St Phila 7
Pa (8-9-16-20-21)—ADV PG 90
Bliss Electronic Corp Sussex NJ (2-19-26)
Bogue Electric Mfg Co 52 Iowa Ave Paterson 3
NJ (2)
Bortion Engineering Dix M J Johnson Alcreaft Engi-

NJ 1427 Borden Engineering Div neering Co Box 10 Morristown NJ (2-8-11) Bright Star Industries 600 Getty Ave Clifton (6)

(6)

Brundee Co 48 Hale St Cranford NJ (11-12)

Cincinnati Clock & Instrument Co 1117 Harrison
Ave Cincinnati 14 Ohio (3)

Davenport Mfg Div Duncan Electric Co Inc 2532

N Eiston Ave Chicago 47 III (2-8)

Deligners for Industry Inc 4242 Fulton Pkwy
Cleveland 9 Ohio (2-6-12-18)

Dice (J W) Co Englewood NJ (6-10-22)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza

South Long Island City 1 NY (2-23)

Fisher Research Laboratory Inc 1961 University
Ave Palo Alto Calif (11)

G-C Electronics Co 400 S Wyman St Rockford III

(23) G-C EI (23)

(23)
General Electric Co Apparatus Sales Schenectady
5 NY (2-3-4-5-8)
General Radio Co West Concord Mass (15-17)
Glodak Co Inc 15-44 W Glenoaks Blvd Glendale 1
Calif (11)
Gray Instrument Co Mill Rd Andalusia Pa (15)
Haydon (A W) Co 4060 Ince Blvd Culver City
Calif (24)
Higher Electrical Instrument Co 10614 Dupont Ave

Calif (24)

Hickok Electrical Instrument Co 10614 Dupont Ave
Cleveland 8 Ohio (5-17-18)

Cleveland 8 Ohio (5-17-18)
Holvo Industries Inc. 442 Elm St. Sycamore III (6)
Holvo Industries Inc. 442 Elm St. Sycamore III (6)
Holvo Industries Inc. 442 Elm St. Sycamore III (2-8-13)—ADV PG 103
Industrial Development Labs Inc. 982 River Rd
Edgewater NJ (15)
Instrument Laboratories 315 W Walton PI Chicago
10 III (2)
Jackson Electrical Instrument Co. 124 McDonough
St. Dayton 2 Ohio (2-18)
Kay Electric Co. Maple Ave. Pine Brook NJ (2)
Leeds & Northrup Co. 4970 Stenton Ave. Phila 44
Pa (15)
Martindale Electric Co. 1383 Hird Ave. Classiand 7

artindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-2-8-13-14) eters Inc 5353 N Keystone Ave Indianapolis 20 Ind (2) Meters

MULTI-Amp Div Multi-Amp Electronic Corp 465C Lehigh Ave Union NJ (3-6-8-19-21-22) Nankervis (Geo L) Co 15300 Fullerton Ave Detroit 27 Mich (5)

dustries Inc P O Box 397 Bayonne NJ Opad Electric Co 43 Walker St New York 13 NY (8)

Parr Mfg Corp 48 Hale St Cranford NJ (11)
Peschel Electronics Inc RFD #1 Patterson ? (2)

Plaster-Eye Co 2560 Noblestown Rd Pittsburgh 5 Pa (11-12) Potter & Rayfield Inc P O Box 1042 Atlanta Ga (1-5)

(1-5)
Principle Research & Development Corp 200 Citizens
Bidg Aberdeen SD (12)
Rogers Electric Laboratories 2651 Shaker Rd CleveLand Heights 18 Ohio (11)
Chauer Mfg Corp 4500 Alpine Ave Cincinnati 42
Ohio (1)

Ohio tar Sensitive Research Instrument Louis New Rochelle NY (12) Shallcross Mfg Co Preston St Selma NC (11) Simpson Electric Co 5200 W Kinzle St Chicago 44

Simpson Electric Co 5200 W Kinzie St Chicago 44 Ill (2-8-18) Sittler Corp 18 N Ada St Chicago 7 Ill (2) Slaughter Co College & Young Sts Piqua 5 Ohio (8-17) On-Tools Corp 8028 28th Ave Kenosha Wis

sen & Co Richards Ave South Norwalk Conn

(12)
Southwestern Industrial Electronics Co 10201 Westheimer (P 0 Box 22187) Houston 27 Tex (15)
Speedex Mfg Co 418 S Wyman St Rockford III (2)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (5)
States Co 19 New Park Ave Hartford 6 Conn (19)

(19)

(19)
Stewart Bros Div Instrument Laboratories 315 W
Walton PI Chicago 10 III (2-11)
Sticht (Herman H) Co Inc 27 Park PI New
York 7 NY (2-6-8-13-15-16-17)
Tektronix Inc P O Box 500 Beaverton Ore (18)
Triplett Electrical Instrument Co 286 Harmon Rd
Biuffton Ohio (18)

Tektronix III.

Triplett Electrical Instrument Co 200

Bluffton Ohio (18)

United States Rubber Co 1230 Avenue of the Americas New York 20 NY (11)

Von Corp 1036-40 Lomb Ave S W (P 0 Box 3566) Birmingham Ala (8-12)

Waterman Products Co Inc 2445-63 Emerald St Po (18) Phila 25 Pa (18)
aveland Electric Co 5542 N Ashland Ave Chicago

111 (1)

Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-5)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gate-way Center (Box 448) Pittsburgh 30 Pa (2)

—ADV PG 2nd Cover

Whitney Blake Co 102 Purshing St New Haven 14 Conn (12) Yokogawa Electric Works Inc 40 Worth St New York 13 NY (8-16)

#### 10D. BURGLAR ALARM SYSTEMS

American District Telegraph Co 155 Sixth Ave New York 13 NY (2-3) American Sentry Inc. 84 Bethlehem Pike Phila-delphia 18 Pa (2) Auth (1) Electric Co Inc 34-20 45th St LIC 1 NY

(1)

Bogen-Presto Co Route 4 & Forest Ave (P O Box 500) Paramus NJ (2)

Central Station Signals Inc 53 W 23 St New York 10 NY (1-2-3)

Edwards Co Inc Norwalk Conn (1-2)

Industrial Automation Corp 2415 W Montrose Ave Chicago III (1-2)

Kidde Ultrasonic & Detection Alarms Div Waiter Kidde & Co Inc 459 Brighton Rd Clifton NJ (1-2-3)

Minneacolis-Honeywell Regulator Co 2753 Fourth

Minneapolis-Honeywell Regulator Co 2753 Fourth Ave S Minneapolis 8 Minn (2-3) Partick & Wilkins Co 51 N Seventh St Phila 6 Pa (1-2) notobell Co Inc 43 Vesey St New York 7 NY (1-2-3)

(1-2-3)
Recora Co Inc Powis Rd (Box 68) St Charles III
(1-2)
Reeve Electrical Co Inc 120 W 42nd St New York
36 NY (2)
Scott (H H) Inc 111 Powder Mill Rd Maynard
Mass (2)

#### 10E. FIRE ALARM SYSTEMS

### Residential Commercial & industrial

Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (2) American District Telegraph Co 155 Sixth Ave New York 13 NY (2) American Sentry Inc 84 Bethlehem Pike Phila-delphia 18 Pa (2) Auth Electric Co Inc 34-20 45th St LIC 1

NY (2) TOCALL CO 58 Warden Ave Shelby Ohio (2)—ADV PG 110 stile Engineering Co P 0 Box 35 Seneca Castle NY (1-2) AUTOCALL

(2)—ADV PG 110
Castle Engineering Co P O Box 35 Seneca Castle
NY (1-2)
Central Station Signals Inc 53 W 23 St New
York 10 NY (2)
Couch (S H) Co Inc 3 Arlington St North Quincy
71 Mass (2)
Edwards Co Inc Norwalk Conn (1-2)
Electronics Corp of America One Memorial Dr
Cambridge Mass (2)
Ellenco Inc 3322 M St N W Washington 7 DC
(2)

Ellen. Faraday Inc 2011 W Beecher Rd Adrian Mich (2)

(2)

•FEDERAL SIGN & SIGNAL CORP 13626 S Western Ave Blue Island III (2)—ADV PG 118

Fire Alarm Thermostat Gorp 53 W 23 St. New York 10 NY (1-2)

Fire Detective Inc 300 Chancellor Ave Newark 12 NJ (1-2)

Fyr-Fyter Co Engineering Systems Div P 0 Box 66 Edison NJ (2)

Gamewell Co Newton Upper Falls 64 Mass (2) Industrial Automation Corp 2415 W Montrose Ave Chicago III (1-2)

International Business Machines Corp Times Equip-

rnational Business Machines Corp Times Equ ent Div 590 Madison Ave New York 22 Internat (2)

Kidde Ultrasonic & Detection Alarms Div Walter Kidde & Co Inc 459 Brighton Rd Clifton NJ (1-2)

(1-2)
Minneapolis-Honeywell Regulator Co 2753 Fourth
Ave S Minneapolis 8 Minn (2)
National Time & Signal Corp 21800 Wyoming Ave
Detroit 37 Mich (2)
Newark District Telegraph Co 372 Plane St
Newark 2 NJ (2)
Partrick & Wilkins Co 51 N Seventh St Phila
6 Pa (2)
Rever Fletzical Co Inc. 120 W 42rd St New York

Reeve Electrical Co Inc 120 W 42nd St New York 36 NY (2) sell & Stoll Co Inc 125 Barclay St NY 7 NY

(2)

(2)
Standard Electric Time Co 89 Logan St Springfield 2 Mass (2)
Stromberg Div General Time Corp 135 S Main
St Thomaston Conn (2)
WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (Box 448) Pittsburgh 30 Pa
(1-2)—ADV PG 2nd cover
Wheelock Signals Inc Branchport Ave Long Branch
N. (2)

#### 10F. SIGNAL & COMMUNICATION SYSTEMS

Calling, paging & locating systems
In-and-out registers
Intercom systems and equipment
Public address systems
Closed circuit TV
Master antenna systems & accessories
Private telephone systems
Two-way radio systems
Country

Addrafters Co 325 W Huron St Chicago 10 III (1-3-4) Aitken-Reed Inc 2802 Wollmer St Manitowac Wis

Hills American Sentry Inc 84 Bethlehem Pike Philadeiphia 18 Pa (1-4)
Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-2-3-7)

AUTOCALL CO 58 Warden Ave Shelby Ohio (1)

ADV PG 110 CO Northiske III (3-7) Automatic Electric Co Northiake III (3-7)
Beil Sound Systems Inc 555 Marion Rd Colum
7 Ohio (4)

7 Ohio (4)
Bliss Electronic Corp Sussex NJ (2-3-4)
Bliss Electronic Corp Sussex NJ (2-3-4)
Bliss Electronic Corp Sussex NJ (2-3-4)
Sogen-Presto Co Route 4 & Forest Ave (P 0 Box 500) Paramus NJ (1-3-4)
Couch (S H) Co Inc. 3 Arlington 5t North Quincy 71 Mass (1-2-3-8)
Dalmotron Co 534 Laurel St San Carlos Calif (1-3-4-6)
Beigners for Industry Inc (1-3-4-6)
Diamond Power Specialty Corp P 0 Box 415 Lancaster Ohio (5)
Dukane Corp St Charles III (1-3-4-7)

caster Ohio (5)

Dukane Corp St Charles III (1-3-4-7)

Edwards Co Inc Norwalk Conn (1-2-3)

Execution Inc 415 Lexington Ave New York 17

NY (1-2-3-4-7)

Fanno Electronic Industries Inc 439 Frelinghuysen

Ave Newark NJ (3-7-4)

Faraday Inc 2011 W Beecher Rd Adrian Mich (2)

Feiler Engineering & Mfg Co 8026 N Monticello Ave Skokie III (3)
Fisher Berkeley Corp 4224 Holden St Emeryville Calif (1-3)
General Electric Co Industrial Electronics Div Technical Products Dept Electronics Park Syracuse NY (5)
Godfrey Mfg Co 1633 N Halsted St Chicago 14 III (3)

Godfrey M

Godfrey Mrg Co 1633 N Haisted St Chicago 14
III (3)
Hammarlund Mfg Co Inc 460 W 34 St NY 1
NY (8)

HISE-McCANN TELEPHONE CO INC 25th St &
3rd Ave Brooklyn 32 NY (3-9)—ADV PG 122
Insul-8-Corp 1369 Industrial Rd San Carlos (5) International Business Machines Corp Times E ment Div 590 Madison Ave New York 22 (7)

International Telephone & Telegraph Corp Industrial Products Div 15191 Bledsoe St San Fernando Calif (5) vex Electronics P O Box 646 Redlands Calif
(6)

(6)
Jerroid Electronics Corp Jerrold Bldg 15th & Lehigh Ave Philadelphia 32 Pa (1.5-6)
Kin Tel Div Cohu Electronics Inc. 5725 Kearney
Villa Rd. San Diego 12 Calif (5)
Kirkland (H R) Co 8 King St Morristown NJ
(1.2)
Jake Mfg Co 23/33 Chastaut S 0 Dakland Calif

Mfg Co 2323 Chestnut St Oakland Calif

G.-6)
Loge Electronics Inc 2171 W Washington Blvd
Los Angeles 18 Calif (1-3-4)
Lovsted (C M) & Co Inc 4000 W Marginal Way
Seattle 6 Wash (1)
Minneapolis-Honeywell Regulator Co 2753 Fourth
Ave S Minneapolis 8 Minn (3)
Motorola Communications & Electronics Inc 4501
W Augusta Blvd Chicago 51 III (1-8)
Murdock Corp 158 Carter St Chelsea 50 Mass
(3) Murdo.

(3)
Newcomb Audio Products Co 6824 Lexington Ave
Hollywood 38 Calif (1-4)
Nutone Inc Madison & Red Bank Roads Cincinnati
27 Ohio (3)
O'Brien Electric Corp 6514 Santa Monica Blvd
Hollywood 38 Calif (1-3-4)
Partrick & Wilkins Co 51 N Seventh St Phila 6
Pa (1-2)
Progress Mfo Co Inc Castor Ave & Tulio Co Phila

Progress Mfg Co Inc Castor Ave & Tulip St Phila 34 Pa (3)

Progress may 34 Pa (3)
Radio Corp of America Industrial Electronic Products Front & Cooper Sts Camden 2 NJ (1-3d Accessories Corp Tenakill Park Cresskill (10) NJ NJ (10)
Rauland-Borg Corp 3535 West Addison St Chicago
18 III (1-3-4)
Rheem Califone Corp 1020 N La Brea Ave Hollywood 38 Calif (4)
Rittenhouse Co Inc 68 East St Honeoye Falls
NY (3)
Roche (Paul C) Co.

Roche (Paul C) Co Inc 11 Park Pl New York 7 NY (3-7) NY US-17 Simpson (Mark) Mfg Co Inc 32-28 49th St Long Island City 3 NY (1-3-4) Sperti Faraday Inc 1322 E Church St Adrian Mich (1-2)

Standard Electric Time Co 89 Logan St Spring-field 2 Mass (1-2)

Talk-A-Phone Co 5013 N Kedzie Ave Chicago 25 III (3)
Tele-Jac Co 2200 Tyler Ave El Monte Calif
(6) (6)
Trade-Wind Div Robbins & Myers Inc
mount Pl Pico Rivera Calif (3)
Webster Electric Co 1900 Clark St Racine Wis
(3-4-7) Wheeler Electronic Corp 150 E Aurora St Water-bury 20 Conn (3-7)
Wheelock Signals Inc Branchport Ave Long Branch NJ (1) Wilmot Castle Co Box 629 Rochester 2 NY
(5)

#### 10G. SOUNDING DEVICES

1. Bells 2. Buzzers
3. Gongs
4. Horns
5. Whistles
6. Chimes
7. Sirens

Acme Fire Alarm Company Inc 106 Seventh Ave New York 11 NY (3-6) Auth Electric Co Inc 34-20 45th St LIC 1 NY (1-2-3-4-6-7) AUTOCALL CO 58 Warden Ave Shelby Ohio

(12-23-46-7)

AUTOCALL CO 58 Warden Ave Shelby Ohio (1-3-4-6-8)—ADV PG 110

Cable Electric Products Inc 234 Daboll St Providence 7 RI (1-2-6)

Couch (S H) Co Inc Arlington St North Quincy 71 Mass (1-2-3-4)

Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island Gity 1 Ny (1-2)

Edwards Co Inc Norwalk Conn (1-2-4-6-7)

Ellenco Inc 3322 M St N W Washington 7 DC (1 through 7)

Faraday Inc 2011 W Beecher Rd Adrian Mich (1)

●FEDERAL SIGN & SIGNAL CORP 13626 S Western Ave Blue Island III (1-2-3-4-6-7)—ADV ern Ave PG 118

PG 118
Gem Electric Mfg Co Inc 237 37th St Brooklyn
NY (1-2)
Hose-McCann Telephone Co Inc
Brooklyn 32 NY (1-2-3)
International Business Machines Corp
Times Equipment Div 590 Madison Ave New York 22 NY
(1-2-3-4-6-7)
INTERNATIONAL REGISTER CO 2620 W Washington Blvd Chicago 12 III (6)—ADV PG 99
Lake Mfg Co 2323 Chestnut St Oakland Calif (1-2)
Lee Electric Inc 566 52nd St West New York NJ

Lee Electric Inc 566 52nd St West New York NJ (1-2-3-6) (1-2-3-6)
Liberty Bell Mfg Co Swainsboro Ga (1-2-3-6)
Line Electric Co 229 River St Orange NJ (2)
Lumenite Electronic Corp 407 S Dearborn St Chicago 5 III (1-2-4-7)
Marvin Electric Mfg Co 648 Santa Fe Ave Los
Angeles 21 Calif (6)
Murdock Corp 158 Carter St Chelsea 50 Mass
(2)

National Time & Signal Corp 21800 Wyoming Ave Detroit 37 Mich (1-2-3-4-6) Nutone Inc Madison & Red Bank Roads Cincin-nati 27 Ohio (6)

Partrick & Wilkins Co 51 N Seventh St Phila 6
Pa (1-2-3-4-6-7) Pa (1-2-3-4-6-7)
Reeve Electrical Co Inc 120 W 42nd St New York
36 NY (1-2-9)
Rittenhouse Co Inc 68 East St Honeoye Falls
NY (1-2-6)
Roda'e Mfg Co Inc 6th & Minor Sts Emmaus Pa
(1-2)
Sireno Signal Mfg Co AS Passaic Ave Kearny

Sireno Signal Mfg Co 65 Passaic Ave Kearny NJ (7)

N.J. (7)
Spies Electric Works 564 W Van Buren St. Chicago
7 III (1)
Standard Electric Time Co. 89 Logan St. Springfield 2 Mass (1-2-3-4-6)
Sterling Siren Fire Alarm Co. Inc. 12 Bartlett St.
Rochester 8 NY (7)
Suttle Equipment Co. 135 S LaSalle St. Chicago 3
III (1-2)

ine Mfg Corp 1430 Ferris Place New York 61 NY (1-2) Victor Ventilator Div Philip Carey Mfg Co Middle-town Ohio (1-2-6)

Viking Instruments Inc East Haddam Conn (1-2-3-4-7) relock Signals Inc Branchport Ave Long Branch

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

Methods and Instruments for Mainte-nance of Generators, Motors and Power Equipment; 35p; Cat. No. D-62 (Associ-ated Research)

Audible Signal Equipment; 16p; Cat. Sec. K (Benjamin)

10-3 Fire Alarm Systems; 25p; Cat. No. 131A

Hospital Signaling Systems; 17p; Cat. No. 137 (Couch) 10-4

High Precision Potentiometers; 27p (De-Jur) 10-5

10-6 Panel Instruments; 23p (DeJur)

mmunication Systems; 15p; Cat. No. 6000 (Mark Simpson) 10-7

Nurses Calling System; 18p (Wheelock) 10-8 Recording and Indicating Instruments; 72p (West)

#### SECTION 11. **HEATING & COOLING EQUIPMENT**

#### 11A. ELECTRIC SPACE HEATERS

Wall panels & units Ceiling panels & units Ceiling & floor cables Baseboard units Floor furnaces & heaters **Duct heaters** 6. Duct heaters
7. Steam radiators
8. Unit heaters, forced air
9. Central furnaces
10. Portables
11. Heated floor mats
12. Heater & lighting fixture combined
13. Cabinet convectors, heaters & ventilators
14. Bathroom heaters
15. Infrared spot heaters
16. Explosion-proof heaters
16. Crane cab heaters
18. Crane cab heaters

For space heating of buildings. Industrial and commercial heating equipment is listed under "Electric Process Heating." See also "Heat Pumps."

Acme Electric Heating Corp. 99 Reading St. Boston. 19 Mass (1-4-7-10)

Adam (Frank) Electric Co. 3647 Windsor Pl. St. Louis Mo. (1)

Aeroil Products Co. Inc. 69 Wesley St. South Hackensack N.J. (8)

Allied Precision Industries 425 Stevens St. (P. 0. Box 149) Geneva III (1-10)

American Tool & Engineering 2105 Moore St. San. Diego. Calif. (4)

Ampere Industries 60 Boston St. Newark 3 N.J. (2-4-10) Anchor Mfg Co P O Box 959 Manchester NH

(4)
Arvin Industries Inc Columbus Ind (2-3-4-10)
BERKO ELECTRIC MFG CORP 182-20 Liberty
NY (1-2-4-3-10-14-15)—ADV
PG 110
Berns Alr King Corp 3050 N Rockwell St Chicago
III (1)
Broan Mfg Co Inc Hartford Wis (8-12) **BERKO** 

Brown Products Corp 1090 Springfield Rd Union NJ (4) Can Arm Corp P O Box 156 Champlain NY (1-4-10) Carrier (8) Corp Carrier Parkway Syracuse 1 NY (8) Cavalier Corp Electric Heating Div 343 W First St Chattanooga Tenn (1-3-4-10-14)
Ceilheat Inc 5212 Homberg Drive (P 0 Box 10066) Knoxville Tenn (1-3-4-5-8-10)
Circle Air Industries Inc 244 Herkimer St Brooklyn 16 NY (1-4-8-10)
Continental Radiant Glass Heating Corp 4 W 40 St. New York 18 NY (1-4-10)
Diamond Wire & Cable Co 445 Park Ave Sycamore III (3)
Dixe Ravigant Electric Heat Corp 66 Eleventh St Dixie Raydiant Electric Heat Corp 66 Eleventh St N E Atlanta 9 Ga (2-2-3-10) Easy-Heat Inc 555 N Michigan St Lakeville Ind (3) (3)
Electrical Products Corp State & Water Sts St
Joseph Mich (1-8)
Electric Steam Radiator Corp 1 Electric Ave Paris
Ky (7)
Electro-Ray Mfg Co 8310 N E Highway 99 Vancover Wash (4)
Electromode Div Commercial Controls Corp P
0 80x 1052 Rochester 3 NY (1-3-4-8-10-13-1415-16-17-18) Electrovector Inc 475 Flushing Ave Brooklyn 5 NY (1-4)

NY (1-4)

Emerson Electric Mfg Co 8100 Florisant Ave St Louis 36 Mo (1-3-4-10-12-14)

Emerson-Pryne Co Towne Ave at Monterey (P 0 Box 698) Pomona Calif (2)

Essex Wire Corp Wire & Cable Div 2601 S Adams Marion Ind (3)

Everwarm Inc 3600 Pleasant Ridge Rd Knoxville Tenn (1-3-10)

Gar Wood Industries Inc. Wayne Atlant Co. Gar Wood Industries Inc Wayne Mich (1-2) General Alliance Corp 2105 Moore St San Diego Calif (4) General Electric Co Apparatus Sales Schenectady
5 NY (8-10)

5 NY (8-10)
General Electric Co Wiring Devices Dept 95 Hathaway St Providence R I (3-4-8)
GENERAL ELECTRIC SUPPLY CO 1260 Boston
Ave Bridgeport Conn (1-2-3-4-8-10-12)—ADV
PG 84-85
Glenn Electric Heater Corp 374 Jeliff Ave Newark
NJ (8)

Guyan Machinery Co Inc Box 150 Logan W Va (1-10) (1-10)
Hanovia Lamp Div Engelhard Industries Inc 100
Chestnut St Newark 5 NJ (2)
Heatmore Inc 651 Driggs Ave Brooklyn 11 NY
(1-2-4-10) neatmore Inc 651 Driggs Ave Brooklyn 11 NY (1-2-4-10)
Hotpoint Co 5600 W Taylor St Chicago 44 III (4)
Hunter Div Robbins & Myers Inc 2500 Frisco
Ave Memphis 14 Trenn (1-4-10)
Ilg Electric Ventilating Co 2850 N Pulaski Rd
Chicago 41 III (8)
Industrial Engineering & Equipment Co Inc 24
Hanley Industrial Ct St Louis 17 Mo (6)
International Oil Burner Co 3800 Park Ave St
Louis 10 Mo (4-9)
Interstate Rubber Products Corp 908 Avila St Los
Angeles 12 Calif (11)
Kilbury Mfg Co Inc 14529 Hawthorne Blvd Lawndale Calif (8-9)
Mo (10)
Kord Mfg Co Inc 4510 White Plains Rd New York
Kord Mfg Co Inc 4510 White Plains Rd New York Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (10) 70 NY (10)
Kritzer Products Div Peerless of America 5800 N
Fritzer Products Div Peerless of America 5800 N
Fritzer Products Div Peerless of America 5800 N
Fritzer Products Office 11 (9)
Larco Inc Route 20 East Painesville Ohio (18)
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY (1-2-4-8-10)
Martin Stamping & Stove Co
Flectric Heater Div
Fritzer Div Po Box 259 Huntsville Ala (1-3-4-5-10)
Matthews Electric Heater Mfg Co Albertville Ala (1-5-10) McGraw-Edison Co Albion Diw 704 Clark St N Albion Mich (4) Meier Electric and Machine Co Inc 3525 E Wash-ington St Indianapolis 7 Ind (1-3-10) ington St. Indianapolis 7 Ind (1-3-44)
Mission Appliance Corp Hyde Park Station Los
Angeles 43 Calif (1-2)
MODE-CO Div Modern Development Co Box 196 MO-DE-CO Div Modern Development Co Box 196
Encino Callf (1-2-10-12)
Modernheat Cable Corp P O Box 754 Kingsport
Tenn (1-3-4-10) Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wis (9) Nutone Inc Madison & Red Bank Roads Cincinnati 27 Ohio (2-8)

27 Ohio (2-8) Quartz Products Corp 688 Somerset St (P O Box 628) Plainfield NJ (B) Ramco Mfg & Engineering 5413 N E Columbia Blud Portland Ore (4-9)

oberson Inc 1539 E 103 St Seattle 55 Wash (1-3-4-8) Sair Corp 9802 Euclid Ave Cleveland 6 Ohio (3-4-10)
Seaboard Products Corp Electric Heating Div 191
Frelinghuysen Ave Newark NJ (4-10)
Slebring Mfg Co George Lowa (9)
Spartan Electric Radiator Corp 32-55 74th St Maspeth 78 NV (1-47-10)
Sun-Heat Inc 998 E Woodbridge Detroit 7 Mich (3-10) 9802 Euclid Ave Cleveland 6 Ohio un-Tron Corp 7435 W Wilson Ave Chicago 31 III (1-2-4)
Sunwarm Inc 1601 Jared Dr (P 0 Box 266)
Kingsport Tenn (1-3-4-10)
Swan Mfg Co 1801 W 26 St Vancouver Wash
(1-4) Su Swan Mfg Co 1801 W 26 St Vancouver Wash (1-4)

Tennessee Plastics Inc Box 3117 Carroll Reece Branch Johnson City Tenn (1 thru 6-10)

Thermador Electrical Mfg Co 5119 District Blvd Los Angeles 22 Calif (1-4-8-10)

Thermal-Aire of America Inc 10 State Street (Room 905) Boston Mass (1-2-4)

Trade-Wind Div Robbins & Myers Inc 7755 Paramount Pa Pico Rivera Calif (1)

Victor Ventilator Div Philip Carey Mfg Co Middletown Ohio (8)

Vulcan Radiator Co 775 Capitol Ave Hartford 6 Conn (4)

Wesix Electric Heater Co 390 First St San Francisco 5 Calif (1 thru 6-8-10)

Westhoster Brickote Products Co Inc 1528 Williamsbridge Rd NV 61 NV (7)

Weststinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa (1-4-5-6-8-9-10)

WESTINGHOUSE ELECTRIC SUPPLY CO 3 Gateway Center (80x 448) Pittsburgh 30 Pa (1-4-5-6-8-10-13-14-15)

Wing (4, 1) Mfg Co 303 N Stiles St Linden NJ (8)

Vork Div Borg-Warner Corp Gantley Rd York Pa York Div Borg-Warner Corp Gantley Rd York Pa (6) Zeil-Aire Corp Orton Ave Reading Pa (1-3-4-8)

#### 118. HEAT PUMPS

Central, packaged, or custom dual-function units for space heating and cooling of units for buildings.

ne Industries Inc. 620 N Mechanic St Jackson American Coils Co Route 524-Lakewood Rd Farm-neral Electric Co Major Appliance Div Room Air Conditioner Dept Appliance Park Louisville 1 Ky McGraw-Edison Co Albion Div 704 Clark St N Albion Mich Mueller Climatrol Div Worthington Corp 2005 W Oklahoma Ave Milwaukee 1 Wis W Oklahoma Ave Milwaukee I Wis
Perfection industries Div Hupp Corp 1135 Ivanhoe
Rd Cleveland 10 Ohio
Typhoon Air Conditioning Div Hupp Corp 505
Carroll St Brooklyn 15 NY
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa
York Div Borg-Warner Corp Grantley Rd York
Pa

### 11C. ELECTRIC PROCESS HEATING

Electric ovens
Electric furnaces
Electric steam boilers
Dielectric heaters
Induction heaters
Infrared heaters
Heating elements
Soil, pige, & snow-melting cable or tape
Wire preheaters

10. Immersion heaters
11. Swimming pool heaters
12. Industrial hotplates
13. Snow-multing mats
14. Engine heaters

Electrical equipment used to provide heat for commercial or industrial processes.

Acme Electric Heating Corp 99 Reading St Boston 19 Mass (1-7-12)

Acra Electric Corp 9901 Pacific Ave Franklin Park Ajax Electric Co 854 Frankford Ave Philadelphia 23 Pa (2) 23 Pa (2) Ajax Magnethermic Corp 3990 Simon Rd Youngs-town 1 Ohio (1-2-5) Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1-4-5) 1 Wis (1-4-5)
Believue Industrial Furnace Co 2620 Crane Ave
Detroit 14 Mich (1-2)
Berko Electric Mfg Corp 182-20 Liberty Ave
Jamaica 12 NY (8)
Blue M Electric Co 138th & Chatham Sts Blue
Island III (1-2)
Can Arm Corp P 0 Box 156 Champlain NY
(6-7)

Island III (1-2)
Can Arm Corp P 0 Box 156 Champlain NY (6-7)
Ceilheat Inc 5212 Homberg Drive (P 0 Box 10066)
Knoxville Tenn (6)
Coates Electric Mfg Co 3419-11th Ave S W
Seattle 4 Wash (1-2-3)
Com-Pak-Ett Mfg Corp 650 Grand St Allegan
Mich (10)
Corning Glass Works Corning NY (6-7)
Corona Mfg Corp 11300 Tuxford St Sun Valley
Calif (1-6-7)
Cox and Co Inc 115 E 23 St New York 10 NY
(8)

Cutler-Hammer Inc 228 N 12 St Milwaukee 1 Wis (4-5-7) Dalton Electric Heating Co 11 Goodhue St Salem Mass (7) Mass (7)
Despatch Oven Co 619 S E 8th St Minneapolis 14
Minn (1-2-7)
Detroit Electric Furnace Div Kuhlman Electric Co
11400 State Fair Ave Detroit Mich (2)
Doyle (J E) Co 1220 W 6th St Cleveland 13
Ohio (6)

11400 State Fair Ave Detroit Mich (2)
Doyle (J. E) Co. 1220 W 6th St. Cleveland 13
Ohio (6)
Dry Clime Lamp Corp. Greensburg. Ind. (1-7)
Eagle Electric Mfg. Co. Inc. 23-10. Bridge Plaza
South Long Island City 1. NV (7)
Easy-Heat Inc. 555 N Michigan St. Lakeville Ind.
(8-13) Electric Arc Inc 152 Jelliff Ave Newark 8 NJ (1-2-5)

(1-2-5)
Electric Hotpack Co Inc Cottman Ave at Melrose
St Phila 35 Pa (1-2)
Electromode Div Commercial Controls Corp P
Box 1052 Rochester 3 NY (8-13)
Everwarm Inc 3600 Pleasant Ridge Rd Knoonville Everwarm Inc 3600 Pleasant Ridge Rd Knooville Tenn (7) Falcon Equipment Co 13th St (Box E-255) New Brighton Pa (1-2-7) Postoria Corp N Main St Fostoria Ohio (1-6) Fox Products Co 4720 N 18 St Phila 41 Pa (7) Gem Electro Mfg Co Inc 237 37th St Brooklyn NY (7)

NY (7)
General Electric Co Apparatus Sales Schenectady
5 NY (5-7)
Globar Plant (Refractories Div) Carborundum Co
Niagara Falls NY (7)
Grieve-Hendry Co Inc 1350 N Elston Ave Chicago
22 III (1-2)
Hanovia Lamp Div Engelhard Industries Inc 100
Chestnaut St Newark 5 NJ (6)
Harper Electric Furnace Corp 3-9 River St Buffalo
2 NY (2)
Hayes (C I) Inc 800 Wellington Ave Cranston 3-0
Layes (C I) Inc 800 Wellington Ave Cranston 3-0
Layes (C I) Inc 800 Wellington Ave Cranston 3-0
Layes (C I) Inc 800 Wellington Ave Cranston 3-0
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Layes (C I) Inc 800 Wellington Ave Cranston 3-0
Layes (C I) Inc 800 Wellington 8-0
Layes (C I) In

2 NY (2) Hayes (C I) Inc 800 Wellington Ave Cranston 10 R I (1-2-5) R 1 (1-2-5)
Hevi Duty Electric Co 3002 W Burleigh St (P 0
Box 563) Milwaukee 1 Wis (1-2-7)
Huppert (K H) Co 68 30 S Cottage Grove Ave
Chicago 37 III (1-27)
Induction Heating Corp 181 Wythe Ave Bootston box 363) Milwaukee 1 wis 12-27 Huppert (K H) Co 68 30 S Cottage Grove Ave Chicago 37 III (1-27) Induction Heating Corp 181 Wythe Ave Brooklyn 11 NY (1-4-5) Industrial Engineering & Equipment Co Inc. 24

Industrial Engineering & Equipment Co Inc 24
Hanley Industrial Ct St Louis 17 Mo (7)
Jensen Inc 9331 Freeland Ave Detroit 28 Mich Kneisley Electric Co 2501-2509 Lagrange St Toledo 3 Ohio (10)
Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (7)
LaRose (W T) & Associates Inc 31 Ontario St Cohoes NY (4)
Lindberg Engineering Co 2450 W Hubbard St Chicago 12 III (1-2)
Lucifer Furnaces Inc Neshaminy Pa (2)
McGraw-Edison Co Albion Div 704 Clark St N Albion Mich (7)
Michigan Oven Co 415 Brainard Detroit 1 Mich

igan Oven Co 415 Brainard Detroit 1 Mich (1)

(1)\*
Midget Heater & Specialty Co 2801 Pacific Ave Tacoma 4 Wash (7)
Miskella Infra-Red Co E 73rd & Grand Ave Cleveland 4 Ohio (1-6)
Modernheat Cable Corp P 0 Box 754 Kingsport Tenn (8)
Nelson Fletziric Mfo Co P 0 Box 7535 Tulca Nelson Fletziric Mfo Co P 0 Box 7535 Tulca Nelson Fletziric Mfo Co P 0 Box 7535 Tulca elson Electric Mfg Co P O Box 5385 Tulsa Okla (8)

Okia (8)
orth American Electric Lamo Co 1520 North
13th St St Louis 6 Mo (1-6)
ereny Equipment Co Inc Tri-Village Sta Columbus 13th St St Louis 6 Mo (1-6)
Pereny Equipment Co Inc Tri-Village Sta Columbus
12 Ohio (1-2)
Phillips Mg Co Inc 8200 Grand Ave Minneapolis
20 Minn (7)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga
Rysell Inc 1888 Erent St Coupheas Falls Ohio

Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio (1-6-7) Reeve Electronics Inc 609 W Lake St Chicago 6 Roberson Inc 1539 E 103 St Seattle 55 Wash (8)

Rob otron Corp 21300 W Eight Mile Rd Detroit 19 Robotron Corp 21300 W Eight Mile Rd Detroit 19 Mich (5) Safeway Heat Elements Inc Middlefield St (P 0 Box 1109) Middletown Conn (7) Scientific Electric Inc 105-109 Monroe St Garfield NJ (4-5)

Design (1-4-5) (1-4-3) Slebring Mfg Co George Iowa (3-7) Smith-Gates Corp Farmington Conn (8) Southeast Lighting Inc 521 E 20 St Charlotte 1 NC (6) NC (6) Standard and 921 to 20 St Charlotte 1
Sta-Warm Electric Co 53 N Chestnut St Ravenna
Ohio (2)
Star-A Electric Mfg Co Inc 269 Meserole St
Brooklyn 6 NY (7)
Steiner-Ives Co Springfield Rd Union NJ (1)
Sumwarm Inc 1601 Jared Dr (P 0 Box 266)
Kingsport Tenn (8)
Tec Imports 14525 Bessemer St Van Nuys Calif
(6) Thermal-Aire of America Inc 10 State Street (Room 905) Boston Mass (6) Thermal American Fused Quartz Co 18 Salem St Dover NJ (10) Thermolyne Corp 513 Huff St Dubuque Iowa (2-12) Tocco Div Ohio Crankshaft Co 3800 Harvard Ave Cleveland 5 Ohio (5) Trent Inc 201-299 Leverington Ave Phila 27 Pa (1-2-7)

Sherman Industrial Electronics Div of Engineering Design Inc 108 N Gill St State College Pa

C1-6-71
Triangle Equipment Co Inc. 45 River Rd Nutley 10
NJ (1-6)
Triandl Products Ltd 1807-11 S Clark St Chicago
16 III (7)
Trippe Mfg Co 133 N Jefferson St Chicago 6 III
(6) Tuttle & Kift Inc 1823 N Monitor St Chicago 39 Ulanet (George) Co 413-15 Market St Newark 5 NJ (7) elotron Inc 1186 Broadway New York 1 NY (1-6) Vuican Electric Co 88 Holten St Danvers Mass (7)

(7)

Waage Electric Inc 720 Colfax Ave Kenilworth
NJ (7-10)

Walco Electric Co 131 Blackstone St Providence
1 R1 (9)

Watlow Electric Mfg Co 1376 Ferguson Ave St
Louis 14 Mo (7)

Wesix Electric Haeter Co 390 First St San Francisco 5 Calif (6-7-8)

Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (5-6)

Whitaker (Douglas C) Co Inc 141 E Glenside Ave
Glenside Pa (6)

Wiegand (Edwin L) Co 7637 Thomas Blvd Pittsburgh 8 Pa (3-6-7-11-13-14)

Wil-Son Mfg Co Cloverport Ky (1-6)

Wil-Son Mfg Co Cloverport Ky (1-6)

Voung Bros Co 1831 Columbus Rd Cleveland 13

Ohio (1-4)

#### 11E. AIR CONDITIONERS

Industrial & commercial
 Residential, central unit
 Residential, room consol
 Wall, built in
 Wall, built in
 Wall of the consol
 Portable

# Equipment using refrigerating-cycle principle to cool air.

Acme Industries Inc 620 N Mechanic St Jackson Mich (1-2)
Air & Refrigeration Corp 439 Madison Ave New York NY (1)
Airtemp Div Chrysler Corp 1600 Webster St Dayton 1 Ohio (1-2-4-5)
American Colis Co Route 524-Lakewood Rd Farmingdale NJ 1-25 ingdale NJ (1-2) nerican-Standard Industrial Div Detroit 32 Mich Ami (1) Car rrier Corp (1-2-3-4-5-6) Carrier Parkway Syracuse 1 NY (1-2-3-4-5-6). Circle Air Industries Inc. 244 Herkimer St. Brook-lyn 16 NY (1-2-4). Clarage Fan Co. Kalamazoo Mich. (1). Cool-ette Inc. 20080 James Couzens Highway. De-troit 3.5 Mich. (1-2-4). troit 35 Mich (1-2-4)
Curlis Mfg Co Refrigeration Div 1905 Kienlen Ave St Louis 20 Mo (1-2)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 36 Mo (5)
Fedders Corp 58-01 Grand Ave Maspeth NY (2-4-5) Fedders Corp 58-01 Grand Ave Maspeth NY (24-5)
Forston Co 2117-2119 Judiway (P 0 Box 10231)
Houston 18 Tex (1-2-5)
Frick Co Waynesboro Pa (1)
Frigidaire Div General Motors Corp 300 Taylor
St Dayton 1 Ohio (4-5)
General Electric Co Air Conditioning Div Commercial & Industrial Air Conditioning Dept 5
Lawrence St Bloomfield NJ (1)
General Electric Co Air Conditioning Dept Central
Air Conditioner Troup Highway Tyler Tex
(1-2)

Air (1-2) (1-2)
General Electric Co Major Appliance Div Room
Air Conditioner Dept Appliance Park Louisville
1 Ky (4-5)
Gibson Refrigerator
Greenville Mich (1-2-4-5)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (1-2-3-5)—ADV PG 2
Great Northern Mfg Corp 1056 N Wood St Chicago 22 III (2)

Hastings Air Conditioning Co Inc 108 S Colorado
Ave Hastings Neb (1-2)
Hoyt Mfg Corp Forge Rd Westport Mass (1)
Ilg Electric Ventilating Co 2850 N Pulaski Rd
Chicago 41 III (1)
International Oil Burner Co 3800 Park Ave St
Louis 10 Mo (2)
Kauffman Air Conditioning Co 4336 W Pine Blwd
St Louis Mo (1-2-3-4-5)
King Refrigerator Corp 76-02 Woodhaven Blwd
Glendale 27 NY (4)
Larco Inc Route 20 East Painesville Ohio (1)
McGraw-Edison Co Albion Div 704 Clark St N
Albion Mich (2-5-6)
Mueller Climatrol Div Worthington Corp 2005 W
Oklahoma Ave Milwaukee 1 Wis (1-2)
Perfection Industries Div Hupp Corp 1135 Ivanhoe
Rd Cleveland 20 Ohio (2)
Quiet Heat Mfg Corp 46 Oliver St Newark 5 NJ
(1-24-5)
Ready-Power Co 11231 Freud Ave Detroit 14 Ready-Power Co 11231 Freud Ave Detroit 14 Mich (1-2) Mich (1-2) Remington Corp Remington Air Conditioning Div Willey St Auburn NY (1-3-4-5) Willey St Auburn NY (1-3-4-5) University of the Condition of the Conditi (1-2-4)
Typhoon Air Conditioning Div Hupo Corp 505
Carroll St Brooklyn 15 NY (1-2)
United States Air Conditioning Corp P 0 Box 360
Delaware Ohio (1-2)
Welbilt Corp 57-18 Flushing Ave Maspeth 78 L1
NY (5) NY (5)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (1 thru 6)
Whirlpool Corp Benton Harbor Mich (4-5)
Worthington Corp Worthington Ave Harrison NJ
(1) Borg-Warner Corp Grantley Rd York Pa (1-2-3-4-5)

#### ITE. AIR HANDLING EQUIPMENT

Blowers
 Circulating fans
 Exhaust fans, industrial & commercial
 Exhaust fans, residential
 Portable fans
 Residential fans & lighting fixtures

7. Range hoods 8. Induced draft fans

Equipment used for ventilation, exhaust, or circulation of air. See also "Air Condi-

Aerovent Fan Co Inc Ash and Block Sts Piqua Ohio (1-2-3-5) Air Controls Inc 2310 Superior Ave Cleveland 14 Ohio (2-3-4-5) ine Motors Inc 369 Bay View Ave Amity-NY (1) Air-Marine Motors inc. 309 bay view ave Amity-ville NY (1900) or 7401 Telegraph Rd Los Angeles 22 Calif (1-3) Alten Cooler & Ventilator Inc. 704 Woodward St. Rochester Mich (1-2-3-4) Alliance Mfg Co Inc. Lake Park Blwd Alliance Ohio (5) Allis-Chalmers Mfg Co 930 S 70th St Milwaukee 1 Wis (1) 1 Wis (1)
American Coolair Corp 3604 Mayflower St (P 0 Box 2300) Jacksonville 3 Fla (2-3-4)
American-Standard Industrial Div Detroit 32 Mich (1-3-4) Co Inc P O Box 182 Stillwater Minn (1-2-3-5) Arex Co 612 N Michigan Ave Chicago 11 III (2-3) (2-3)
Argo Products Co 3500 Goodfellow St Louis 20
Mo (2-3-4-5)
Atlas Mineral Products Co Mertztown Pa (4)
Atlas Tool and Mfg Co 5147 Natural Bridge Ave
St Louis 15 Mo (4-5)
Baldor Electric Co 4353 Duncan Ave St Louis 10
Mo (2-3-4-5)
Bar-Brock Mfg Co Inc. 6133-35 Linwood Ave mo tc-5-4-3)
Bar-Brook Mfg Co Inc 6133-35 Linwood Ave
Shreveport La (2-3-4)
Berns Air King Corp 3050 N Rockwell St Chicago
III (3-4-1) Bertis Ar Avid Culp 1959 to Rockwell 3: Chicago III (3-4-7)
Bertram (Harvey P) Co 2225 Bogen St Cincinnati Ohio (1-2-3-5)
Broan Mfg Co Inc Hartford Wis (3-4-6-7)
Broan Mfg Co Inc Hartford Wis (3-46-67)
Buffalo Forge Co 490 Broadway Buffalo 5 NY (1-2-3-4)
Burt Mfg Co 936 S High St Akron 11 Ohio (3-4)
Century Fan & Ventilator Co 45 Cedar St Stamford Conn (1-3)
Chelsea Fan and Blower Co 639 South Ave Plainfield NJ (1-2-3-4-5)
Chicago Blower Corp 9867 Pacific Ave Franklin Park III (1-2-3)
Circle Air Industries Inc 244 Herkimer St Brook-Circle Air Industries Inc 244 Herkimer St Brook-lyn 16 NY (1) lyn 16 NY (1)
Clarage Fan Co Kalamazoo Mich (1-2-3)
Commercialaire Corp of America 840 E 98 St
Brooklyn 36 NY (1 thru 5)
Coppus Engineering Corp 344 Park Ave Worcester
10 Mass (1-5)
Dana Fan & Blower Corp 2644 Colerain Ave Cincinnati 14 Ohio (3-4) Kalamazoo Mich (1-2-3) orp of America 840 E 98 St

Davidson Fan Co 213 California St Newton 58 Mass (3)
Dayton Electric Mfg Co 126 S Oakley Blvd Chicago 12 III (1-2-3-4-5)
DeBothezat Fans Div American Machine & Metals Inc East Moline III (2-3-5)
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio (3)
Diehl Mfg Co 1187 Finderne Ave Somerville NO (2-3-4) (2-3-4-5)
Dominion Electric Corp 150 Elm St Mansfield Ohio (3-4-5)
Elliott Co Jeannette Pa (1)
Emerson Electric Mfg Co 8100 Florissant Ave St Louis 36 Mo (2-4-5)
Emerson-Fryne Co Towne Ave at Monterey (P O Box 698) Pomona Calif (1-3-4)
Folsom Co Inc 3104 Oak Lane Dallas 26 Tex (2-3-4-5)
Fort Worth Steel & Machinery Co 3600 McCart Street Po Box 1038 Fort Worth 1 Texas (3)
Fresh'nd-Aire Div Cory Corp 22 N LaSaile St Chicago III (5)
Frield Inc 1250 Rockaway Ave Brooklyn 36 NY (1 thre 5)
Garden City Fan & Blower Co 801 N Eighth St (1 thru 5)
Garden City Fan & Blower Co 801 N Eighth St
Niles Mich (1-2-3)
General Blower Co 8610 Ferris Ave Morton Grove GENERAL ELECTRIC SUPPLY CO 1260 Boston bridgeport Conn (1 thru 7)—ADV PG Ave Bridgeport 84-85 84-85
Globe Industries Inc 1784 Stanley Awe Dayton 4
Ohio (1-2)
Graybar Electric Co Inc 420 Lexington Ave NY 17
NY (1-2-3-4-5)
Hamilton Fan & Blower Co 2644 Colerain Ave
Cincinnati 14 Ohio (1-2-3-4)
Haritzell Propeller Fan Co S Englert Ave Piqua
Ohio (1-2-3-55) Ohio (1-2-3-5) Heinze Electric Co 685 Lawrence St Lowell Mass chman-Pohle Co Inc 300 Lent Ave Le Roy NY (3)
Hunter Div Robbins & Myers Inc 2500 Frisco Ave
Memphis 14 Tenn (2-3-4-5)
Ilg Electric Ventilating Co 2850 N Pulaski Rd
Chicago 41 III (1-2-3-4-5)
IMC Magnetics Corp 570 Main St Westbury NY
(1) (11) Industrial Plastic Fabricators Inc Endicott St Norwood Mass (1-3) International Oil Burner Co 3800 Park Ave St Louis 10 Mo (4) Louis 10 Mo (4)

Iona Ventilator Co Inc 2821-29 W Dauphin St Phila 32 Pa (2-3)

Jeffrey Mfg Co 832 N 4th St Columbus 16 Ohio Co H W Oliver Bldg Pittsburgh 22 Pa (1-2-3) Kisco Co Inc 2414 DeKalb St St Louis 4 Mo (5) Kord Mfg Co Inc 4510 White Plains Rd New York 70 NY (4-5) 70 NY (4-5) Lau Blower Co 2001 Home Ave Dayton 7 Ohio (1 thru 5-7) Leigh Building Products ( Lehigh Fan & Blower Div Pa (3-8) Coopersville Mich (3) Fuller Co Catasauq Coopersville Pa (3-8)
Markel Electric Products Inc 145 Seneca St Buffalo 3 NY (5)
Martin Fan & Blower Co 4634 W 21st Pl Chicago 50 Ill (1-2-3-4-5)
Marvin Electric Mfg Co 648 Santa Fe Ave Los Angeles 21 Calif (4)
McLarty Systems 2600 Dickman Rd Battle Creek Mich (3-5-8) McLarty System Mich (3-5-8) Mich (3-5-6)
Mich (3-5-6)
McLean Engineering Laboratories 70 Washington Rd (P 0 Box 228) Princeton NJ (2-3-4)
Meier Electric and Machine Co Inc 3525 E Washington St Indianapolis 7 Ind (2-3-4)
National Engineering & Mfg Co 16th & Lamine Sts Sedaila Mo (2-3-4-6)
Nortky Mfg Corp P 0 Box 669 Covington Ky (3-4)
Northern Blower Div Buell Engineering Co 6434
Barberton Ave Cleveland 2 Ohio (3)
Nutone Inc Madison & Red Bank Roads Cincinnati
27 Ohio (4-7)
Peerless Electric Div H K Porter Co Inc 1401 W 27 Ohio (4-7) H K Porter Co Inc 1401 W Market St Warren Ohio (1 thru 4) Perfect-Line Mfg Corp Old Country Rd Agllroad Ave P O 80x 65 Hicksville Li NV (4) Phelps Fan Mfg Co 715 Thomas St Little Rock Ark (2-3-49) Power Line Fan Co Plainfield NJ (3) Progress Mfg Co Inc Castor Ave & Tulip St Phila 34 Pa (4-7) Red Unit Fans Inc Orleans La (2-3-4-5) N St Patrick St New Orleans La (2-3-4-5) N St New Orleans La (2-3-4-5) N St New Orleans La (2-3-4-5) Electric Co 3000 River Rd River Grove 111 (2-5) III (2-5)
Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Texas (2-3-4-5)
Ripley Co Inc Factory St Middletown Conn (1)
Robbins & Myers Inc 1345 Lagonda Ave Springfield Ohio (1-2-3-4) Roberson Inc 1539 E 103 St Seattle 55 Wash -Beam 1755-57 N Keeler Ave Chicago 39 III (4) (4)

Shallcross Controls Inc 2217-21 N 31 St Mil-waukee 8 Wis (1)
Slebring Mfg Co George Iowa (2-3)
Signal Electric Div King-Seeley Corp 1800 13th
St Menominee Mich (2-3-4)
Simpson Co 1470 Doolittle Dr San Leandro Calif
(4) Skil Corp 5033 Elston Ave Chicago 30 III (1) Stanat Mfg Co Inc 524 Shames Dr Westbury NY (1) Skil Corp

Standard Electric Mfg Co Inc Haddon Ave West Berlin NJ (2-3-4) Standard Electric Mfg Co Inc Haddon Ave West Berlin NJ (2-3-4)
Sterling Blower Co 791 Windsor St Hartford Conn (1-3)
Stewart Industries Inc 320 E St Joseph St Indianapolis 2 Ind (4)
Trade-Wind Div Robbins & Mayers Inc 7755
Paramount PI Pico Rivera Calif (1-3-4)
Trane Co 2nd & Cameron Ave La Crosse Wis (3)
United Blower Co Inc 193 Centre St NY 13 NY (1) United Electric Motor Co 178 Centre St NY 13 NY (1) United States Air Conditioning Corp P 0 Box 360 Delaware Ohio Co Box 206 Fort Valley Ga (2-3-4-5) Ventrola Mfg Co 501 S Chestnut St Owosso (2-3-4-5) Ventrola Mfg Co 501 S Chestnut St Owosso Mich (4) Viking Air Products Dlv Lau Blower Co 5601 Wallworth Ave Cleveland 2 Ohio (1-4) West Wind Corp 1800 Airport Way Seattle 4 Wash (1-4-5) Wash (1-4-5) P O Box 2278 Pitts-Wash (1-4-5)
Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1-2-3-5-6)
Westinghouse Electric Corp Sturtevant Div Damon St Hyde Park Boston 36 Mass (1-3)
Wing (L J) Mfg Co 303 N Stiles St Linden NJ (1-3-8) Wing (L (1-3-8) Way Fan & Ventilator Co 531 St Joseph St Orleans 12 La (2-3-4)

#### 11G. AIR CONTROL EQUIPMENT

Humidifiers
 Dehumidifiers
 Air purifiers
 Air ionizers

For control of air moisture content and characteristics.

Alr & Refrigeration Corp. 439 Madison Ave New York City NY (2) Bahnson Co. 1001 S Marshall St. Winston-Salem NC (1) Berns Air King Corp 3050 N Rockwell St Chicago III (2)
Burgess Vibrocrafters Inc Grayslake III (1)
Carrier Corp Carrier Parkway Syvacuse 1 NY (2)
Dampp-Chaser Inc 1404 Spartanburg Hwy Hendersomille NC (2)
Pryomatic Corp 715 N Fayette St (P 0 Box 591)
Alexandria Va (2)
Ebco Mfg Co 265 N Hamilton Rd Columbus 13
Ohio (1)
Fedders Corp 58-03 Grand Am March 19 (2) Fresh'nd-Aire Div Cory Corp 221 N LaSalle St Chicago III (1-2) Fresh no-Aire Div Cary Corp 222 N Essaire St Chicago III (1-2) Gibson Refrigerator Co 515-615 W Williams St Greenville Mich (2) Haertel (Walter) Co 2840 4th Ave So Minneapolis Minn (1) Kauffman Air Conditioning Co 4336 W Pine Blvd Haertel (Walter) Co 2840 4th Ave So Minneapolis Minn (1)
Kaufman Air Conditioning Co 4336 W Pine Blvd St Louis Mo (1)
McGraw-Edison Co Albion Div 704 Clark St N Albion Mich (2-3)
Mtchell Mfg Co 3200 W Peterson Ave Chicago 45 III (2)
Weller Climatrol Div Worthington Corp 2005 W Okiahoma Ave Milwaukee 1 Wis (1)
Remington Corp Remington Air Conditioning Div Willey St Auburn NV (2)
Supreme Electric Products Co 194 Vassar St Rochester 7 NY (1)
Sutrie Equipment Corp 135 S LaSalle St Chicago 3 III (1)
Viking Air Products Div Lau Blower Co 5601 Walthorth Ave Cleveland 2 Ohio (1)
Walton Laboratories Inc 1186 Grove St Irvington 11 NJ (1) State Cours Rochester S NY (1) Walton Labor 11 NJ (1)
Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa (1)
Westinghouse Electric Corp Sturtevant Div
St Hyde Park Boston 36 Mass (2)
Whirlpool Corp Benton Harbor Mich (2)

#### TECHNICAL LITERATURE

To obtain the following literature, enter the appropriate Code Numbers\* on the Free Information cards elsewhere in this issue.

Description, Pages Catalog No. & Mfr.

11-1 Refrigeration and Air Conditioning; 43p; Cat. No. R-8 (Airserco)

- 11-2 Heating & Ventilating Units; 49p; Cat. No. 9727 (American-Standard) 11-3 Airfoil Bladed Fans; 59p; Cat. No. A-1103 (American-Standard) Breeze Conditioning Systems; 48p (Cool-11-4
- 11-5 Electric Ovens and Furnaces; 197p; Cat. No. 158
- Roof Ventilators and Wall Louvres; 15p (Burt) 11-6
- Industrial Fans; 24p; Cat. No. 600-60A (Chelsea) 11-7
- 11-8 Industrial Fans & Cyclone Separators; 16p; Cat. No. 500-C (Fort Worth)
- 11-9 Propeller Fans, Propellers and Accessories; 16p; Cat. No. CFJ-160 (Hamilton)
- Industrial Electric Heat Treating Equip-ment; 130p (Hayes) Air Conditioning; 19p; Cat. No. AC-573 11-11
- 11-12 Heating Elements; 34p (Heatube)
- 11-13 Industrial Fans; 19p (Power Line)
- 11-14 Blowers; 16p; Cat. No. B-101 (Ripley)
- 11-15 Industrial Heating Equipment; 28p (Sta-Warm)
- 11-16 Induction Heating Equipment; 19p; Cat. No. 22G (Ohio Crankshaft)
- 11-17 Electrically Heated Industrial Equipment; 68p (Trent)
- 11-18 Electrical Heating Units; 64p; Cat. No. 60
- Electrical Heating Units and Equipment for Industry; 22p; Cat. No. CS-600 (Wiegand) 11-19

### SECTION 12. TOOLS, SUPPLIES & EQUIPMENT

#### 12A. LINEMAN'S TOOLS & ACCESSORIES

- Climbing equipment
  Disconnect sticks
  Hoists, packs, gins & winches
  Pike poles and tongs
  Protective clothing & equipment
  Tamping, digging & trenching hand
  tools
- tools
  Tool pouches, buckets & accessory bags
  Tree trimmers & pruners
  Wire-stringing equipment
  Hot line tools
  Ladders
  Insulpted immans

- 12. Insulated jumpers
  13. Safety grounding equipment

Heavy mobile pole line equipment is listed ugder "Line Trucks & Mobile Equipment" in Section 1.

Adams Engineering Co 31711 Solon Rd Solon Ohio
(3) Bartlett Mfg Co 3003 E Grand Blvd Detroit 2 Bashlin (W M) Co Bashlin Bldg Grove City Pa (1-7) (1-7)

8 odendieck Tool Co P O Box 499 Taylorville III
(2-3-4-8-10-11-12-13)

8 uffalo Machine Mfg Co 586 Tonawanda St Buffalo
7 NY (9)

Chance (A B) Co 210 N Allen St Centralia Mo
(2-3-4-6-7-8-10)

(2-3-4-6-7-8-10)

(2-3-4-6-7-8-10)

(2-3-4-6-7-8-10)

Charleston Rubber Co Stark Industrial Park Charleston SC (5)

Chisholm-Moore Hoist Div Columbus McKinnon Corp 6072 Fremont Ave Tonawanda NY (3)

Coffing Hoist Div Duff-Norton Co Darwille III (3)

Coffing Hoist Div Duff-Norton Co Darwille III (3)

Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (3)

Pavid's Gloves Inc 21 W Pleasant St Springfield Ohio (5)

Dicke Tool Co 1201 Warren Ave Downers Grove 111 (4-6-8) Distribution & High Line Specialties Co 2100 Del Norte St Louis 17 Mo (9) Dorsey (John E) Co 570 E First St Boston 27

Mass (5)

GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave Bridgeport Conn (1 thru 10)—ADV PG 84-85
General Scientific Equipment Co Limekiln Pike & Williams Ave Philadelphia 50 Pa (5-7)
Goodall Rubber Co 493 Whitehead Rd Trenton NJ (5)
Handy Angle Div Lug-All Co 355 Lancaster Ave Haverford Pa (3)
Hendrix Wire & Cable Corp Milford NH (9)
Highway Trailer Co 405 E Fulton St Edgerton Wis (3)

Highway T Wis (3)

Holan (3-6) Corp 4100 W 150 St Cleveland 35 Ohio d & Co 6301 Butler St Pittsburgh 1 Pa unter Tools 9851 Alburtis St. Santa Fe Springs Calif (7) (6.9)

Joslyn Mfg & Supply Co 3700 S Morgan St Chi-cago 9 III (3-4-6-8-9) cago 9 TIII (3-4-6-8-9)
Kearney (James R) Corp 4236 Clayton Ave St
Louis 10 Mo (2-6-8)
King Mfg Corp 3146 N Chicago Ave Chicago 22
III (3)
Klein (Mathias) & Sons 7200 McCormick Rd Chicago 45 III (1-3-7-9) ine Savidge Co Inc 163 N Third St Phila 6 Pa (1-7)

LeTourneau tRG) Inc 2399 S MacArthur Long-view Tex (3)
Line Material Industries McGraw-Edison Co 700 W Michigan St Milwaukee Wis (2-6-9)
Mall Tool Co 25000 S Western Ave Park Forest
III (6)

MoCabe-Powers Body Co 5900 N Broadway St Louis 15 Mo (3)

Miller Equipment Co Inc 13th & New Sts FrankIlle Pa (1-7)

Miller-Robinson Co 7007 Avalon Blvd Los Angeles
3 Calif (8)

Mine Safety Appliances Co 201 N Braddock Ave
Pittsburgh 8 Pa (1-5-7)

Mitchell Industries Inc Box 17 Municipal Airport
Mineral Wells Tex (1)

Proto Tool Co Box 3519 Terminal Annex Los
Angeles 54 Calif (7)

Robot Industries Inc 7041 Orchard St Dearborn
Mich (3)

& C Electric Co 4435 Ravenswood Ave Chicago
40 Ill (2)

Safety Live Line Tool Co 973 86th Ave Oakland

Safety Live Line Tool Co 973 86th Ave Oakland 21 Calif (2-3-4-7-9-10) 21 Calif (2-)-4-7-9-10)
Sasgen Derrick Co 3101 Grand Ave Chicago III (3)
Shaw-Box Crane & Hoist Div Manning Maxwell & Moore Inc Muskegon Mich (3)
Sherman & Reilly Inc 1 Broad St Chattanooga 2

Tenn (3-9) tenn (3-7)\*
Silent Hoist & Crane Co 841-63rd St Brooklyn
20 NY (3)
Snyder (M L) & Son Inc 1897 E York St Phila
25 Pa (5)

Southern Electrical Equipment Co 308 West Bland at Mint St Charlotte 3 NC (2) Surety Rubber Co North High St Carrollton Ohio (5)

Swett (A L) Iron Works 166 Glemwood Ave Median NY (6) Templeton Kenly & Co Gardner Rd Broadview III (3)

Telsta Corp 2900 Spring St Redwood City Calif
(9)

(9) (Hillies Safety Supply Co Inc Jefferson St at Highway 50 Lee's Summit Mo (1-5-7) Utilitles Service Co 1 Pine St Allentown Pa (4) Watteredge Co 19629 West Lake R6 Rocky River 16 Ohio (9) Wilson Rubber Co 1200 Garfield Ave SW Canton 6 Ohio (5) Wiss (1) & Sons Ca 33 Littleton Aug Naguet 7 & Sons Co 33 Littleton Ave Newark 7

#### 12B. WIRE & CABLE TOOLS & EQUIPMENT

1. Benders, cable & strand
2. Cutting, stripping & splicing tools
3. Wire gages
4. Pulling-in grips, guides, jacks & winches
5. Wire reels, lifts, stands & carts
6. Pressure-connector tools
7. Staplers
8. Twisters
9. Wire measurers
10. Vulcanizing equipment
11. Fish tape, grips, pullers, reels & leaders
12. Wire installation guns

AMP Inc Eisenhower Blvd Harrisburg Pa (2-6)
Adams Engineering Co 31711 Solon Rd Solon
Ohio (4-5)

Ohio (4-5)
Allen Iron & Steel Co P O Box 550 Norristown
Pa (5-9)
Aluminum Co of America 1501 Alcoa Bldg Pittsburgh 19 Pa (6)
American Electrical Heater Co 6110 Cass Ave
Detroit 2 Mich (2)
American Pulley Co 4200 Wissahickon Ave Philadelphia 29 Pa (5)

Anthony (F M) Co 773 University Ave Berkeley 10 Calif (2-6)
Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (11)
Ark-Les Switch Corp 51 Water St Watertown Mass (6)

Arrolet Corp Foot of Bower St Montgomery Pa

Arrow Fastener Co Inc 1 Junius St Brooklyn 12 NY (7) Artos Engineering Co 2757 S 28 St Milwaukee 46 Wis (2-9) 12650 Brookpark Rd Cleveland 30 Ohio (4-11) Bashlin (W M) Co Bashlin Bldg Grove City Pa

Bay-Tronic Co 43 Evergreen St Bayonne NJ (2-8) Bodendieck Tool Co P O Box 499 Taylorville 111 (2)

(2)
Burbanan Electrical Products Corp 434 U S Route
22 Hillside NJ (2-6)
Burbank Electrical Products 215 W Palm Ave P O
Box 7 Burbank Calif (2-11)
Burndy Corp Norwalk Conn (3-6)
Cam-Lok Div Empire Products Inc 9213 Blue Ash
Rd Cincinnati 42 Ohio (2-6-10)

Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (4)

(4)
Columbia Products Inc Wrightsville Pa (5-9)
Cope (T J) Div Rome Cable Corp Third & Walnut
Sts Collegeville 5 Pa (1-4-11)
Crescent Tool Co 200 Harrison St Jamestown NY
(4) Davis Electric Co 28 Parker St Wallingford Conn

Dicke Tool Co 1201 Warren Ave Downers Grove III (4-5) Duff-Norton Co P O Box 1889 Pittsburgh 30 Pa (5)

(5)
Electro Dynamics Corp 4917 St Elmo Ave Bethesda
14 Md (2-6)
Ericson Mfg Co 5209 Euclid Ave P O Box 1401
Cleveland 3 Ohio (5)
Fullman Mfg Co 1209-1215 Jefferson St Latrobe
9a (11) Pa (11)
G-C Electronics Co 400 S Wyman St Rockford III
(2)

(2)
General Hardware Mfg Co Inc 80 White St NY 13
NY (2-3)
Gleason Reel Corp 740 N Plankinton Ave Milwaukee 3 Wis (5)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (2-4-6)—ADV PG 2
Greenlee Tool Co 2136 Twelfth St Rockford III
(4)

Heller Industrial Fastener DIv Heller Roberts Mfg Corp 6115 Carnegie Ave Cleveland 1 Ohio (7) Highway Trailer Co 405 E Fulton St Edgerton Wis (4)

Holan Corp 4100 W 150 St Cleveland 35 Ohio (4-5) Industries Inc 442 Elm St Sycamore III (2-11)

Hunter Tools 9851 Alburtis St Santa Fe Springs Calif (2) Husky Products Inc 5300 Vine St Cincinnati 17 Ohio (4)

Hykon Mfg Co 163 E State St (P O Box 923 EP)
Alliance Ohio (5-9)

• IDEAL INDUSTRIES INC 5136 Park Ave Sycamore III (2-6-11)—ADV PG 103

Interstate Drop Forge Co Special Products Div 4051 N 27 St Milwaukee 16 Wis (2) Jerrold Electronics Corp Jerrold Bldg 15th & Lehigh Ave Philadelphia 32 Pa (2-6) Jet Line Products Inc 615 Fugate Ave Charlotte

Jet Line P NC (12) Joslyn Mfg & Supply Co 3700 S Morgan St Chi-cago 9 III (6) Jcy Mfg Co Electrical Products Div 1201 Mack-lind Ave St Louis 10 Mo (10)

Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Me (6) Kellems Co Inc 15 Williams St Stonington Conn (4) King Mfg Corp 3146 N Chicago Ave Chicago 22 Klein (Mathlas) & Sons 7 cago 45 III (2-4-8-11) 7200 McCormick Rd Chi-Klein (Mathlas) & Sons 7200 McCormick Rd CRI-cago 45 III (2-48-11)
LaRaus Mfg Co Inc LeRoy NY (5)
Lew Electric Fittings Co 627 W Lake St Chicago 6
III (11)
Line Material Industries McGraw-Edison Co 700
W Michigan St Milwaukte Wis (1-4)
Lint (Clyde W) 2323 W 18 St Chicago 8 III
(5-9-11)
Modifications Co 5005 Detroit Ave Clemand Madison Equipment Co 5405 Detroit Ave Cleveland 2 Ohio (11)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (2)
Marvel Rack Mfg Co Inc 96 43rd Ave NE Minneapolis 21 Minn (9)
Miller Electric Mfg Co Inc 718 S Bounds St Appleton Wis (13)
Miller Equipment Co Inc 13th & New St Franklin Pa (2)
Milwaukee Parts Corp 607-15 S Sixth St Milwaukee 4 Wis (2)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh B Pa (2)
Minneapolis Electric & Construction Co 80 S 12 St Minneapolis Electric & Construction Co 80 S 12 St Minneapolis 3 Minn (9) Olympic Instruments Inc Vashon Wash (5-9)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2)
Rattan Mfg Co 10 Wall St (P O Box 1745) New
Haven 7 Conn (11)
Richards (J R) Co P O Box 482 Carnegie Pa (11)
Roll-A-Rec Co 4630 Reading Rd Cincinnati 29
Ohio (5) Onio (3)

Rush Wire Stripper Div Eraser Co Inc 1068 S
Clinton St Syracuse 4 NY (2-8)
Sherman (H B) Mfg Co 22 Barney Battle Creek Clinton 3.
Sherman (H B) Mfg Co 22 Barney Mich (6)
Mich (6)
Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (2) Speeu. (2) Steel City Electric Co 1207 Columbus Ave Pitts-burgh 33 Pa (11) Steel Electric Products Co Inc 5602 18th Ave Brooklyn 4 NY (11) Suttle Equipment Corp 135 S LaSaile St Chicago 3 III (5) Swett (A L) Iron Works 166 Glenwood Ave Medina NY (5) Te leton Kenly & Co Gardner Rd Broadview III (4) (4)
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ (2-6-11)
Thomas Instrument Co Box 41 Liverpool Rd Phoenix NY (2)
Tomic Sales & Engineering Co 20000 Sherwood Ave Detroit 34 Mich (2)
Triton Mfg Co Inc East Haddam Conn (2)
Utica Drop Forge & Tool Div Kelsey-Hayes Co Utica 4 NY (2)

Maco Profests Co 317 F Ottario St Chicago 11 Vaco Pro ducts Co 317 E Ontario St Chicago 11 raid (G)

Aldman (John J) Co 477 Atlantic Ave Brooklyn

17 NY (9)

Initaker Reel Mfg Co 3704 Jackson St Monroe

La (5) Wiss (J) & Sons Co 33 Littleton Ave Newark 7 NJ (2) Woodhead (Daniel) Co 15 N Jefferson St Chicago 6 1tl (5) o III (5) rkville Metal Products Co 627 Greenwich St New York 14 NY (2)

12C. RACEWAY TOOLS & EQUIPMENT

1. Benders & hickeys, conduit & EMT
2. Cutters & indenters, conduit & EMT
3. Conduit tool pickups & grapples
4. Knockout punches
5. Conduit measurers
6. Pipe pushers
7. Mandrels
8. Reamers
9. Threaders, stocks & dies
10. Pipe vises, stands & holders
11. Conduit racks
12. Bending gauges
13. Bending and pushing pumps
14. Power drives and takeoffs
15. Pipe bevelers

Allen Iron & Steel Co P O Box 550 Norristown Pa (11) American Pipe Bending Machine Co Inc Poultney Vt (1) American Pipe Tool Co 4856 W Kinzie St Chi-cago 44 III (8-9-10) Ampere Industries 60 Boston St Newark 3 NJ (6) Appleton Electric Co 1701-59 Wellington Ave Chicago 13 III (1)
Armstrong Bros Tool Co 5200 W Armstrong Ave Chicago 46 11 (9-10)
Arrolet Corp Foot of Bower St Montgomery Pa (1) Athol Machine & Foundry Co 82 South St Athol Mass (10)
Beaver Pipe Tools Inc 310 Dana N E Warren Ohio (2-9-14)
Blackhawk Industrial Div Blackhawk Mfg Co 13320
W Reichert PI Butler Wis (1-4)
BRIEGEL METHOD TOOL CO 104 N E First St Galva III (2-10)—ADV PG 100
C & B Engineering and Fabricating Corp P O Box 8701 Houston Tex (1-5)
Chamor Mfg Corp 43-63 11th St Long Island

8701 Houston Tex (1-5)
Chamor Mig Corp 4-6-3 lith St Long Island
City 1 NY (1)
Collins Machinery Corp 955 Monterey Pass Rd
Monterey Park Calif (2-9)
Cope (T J) Div Rome Cable Corp Third & Walnut
Sts Collegeville 5 Pa (3)
Eric Tool Works 12th & Liberty Sts Erie Pa
(2-9-10)
Gardner Render Co. 5-848 N 24 Pl. Milwaukes 9 Gardner Bender Co 5448 N 24 Pl Milwaukee 9 Wis (1) Wis (1)
Gedney Electric Co Americas Bidg Radio City
NY 20 NY (1)
GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn (1-2-4-8-9)—ADV PG 84-85
General Mardware Mfg Co Inc. 80 White St. NY 13
NY (8)

Greeniee Tool Co 2136 Twelfth St Rockford III (1-4-6-13-14) Hein-Werner Corp 1200 National Ave Waukesha Wis (1) Wis (1)
Henderson Electric Co 25 Greenwood Ave East
Orange NJ (1)
Hill (Walter P) Inc 22183 Telegraph Rd Detroit
19 Mich (1) Hole olub Industries Inc 442 Elm St Sycamore III Hossfeld Mfg Co 460 W Third St Winona Minn Lew Electric Fittings Co 627 W Lake St Chicago 6 III (1) Lidseen of North Carolina Inc 1000 First St Hayes-ville NC (1) Lint (Clyde W) 2323 W 18 St Chicago 8 III (1-4-10) (1-4-10)
Mercury Hydraulics Inc 1632 Wazee St Denver 2
Colo (6)
Midwest Electric Mfg Co 1639 Wainut St Chicago 12 III (1)
Mine Safety Appliances Co 201 N Braddock Ave Pittsburgh 8 Pa (9)
Muncie Gaar Works Inc P D Box 433 Cordele Ga (9)
National Electric Pit III

Ga (9)
National Electric Div H K Porter Co Inc Porter
Bldg Pittsburgh 19 Pa (1)
Nye Tool Co 4120-30 Fullerton Ave Chicago 32 Bidg Pittsburgh 19 Pa (1)
Mye Tool Co 4120-30 Fullerton Ave Chicago 32
III (4-9-10)
Oster Mfg Co 1340 E 289 St Wickliffe Ohio
(8-9-10)
Proto Tool Co Box 3519 Terminal Annex Los
Angeles 54 Calif (2)
Rattan Mfg Co 10 Wall St (P 0 Box 1745)
New Haven 7 Conn (1)
Republic Steel Corp Steel And Tubes Div 224 E
131 St Cleveland 8 Ohio (1-7)
Richards (J R) Co P 0 Box 402 Carnegie Pa
(1)

Ridge 9-10) Tool Co 400 Clark St Elyvia Ohio (2-8-Tool Co 767 S Ellsworth Ave Salem Ohio SILVEY PIPE BENDER CO 2215 Brighton Are Kansas City 27 Mo (1)—ADV PG 126 Spring Load Mfg Corp 6332 Maynard Ave Seattle Wash (2)

Wash (2)
Steel City Electric Co 1207 Columbus Ave Pittsburgh 33 Pa (1)
Steel Electric Products Co Inc 5602 18th Ave
Brooklyn 4 NY (1)
Steelduct Co Republic Steel Bldg Youngstown
Ohio (1) Te pleton Kenly & Co Gardner Rd Broadview III Thepitt Mfg Co Gregg & Hammond Sts Carnegie Pa (1) Pa (1)
Thomas & Betts Co 36 Butler St Elizabeth 1 NJ
(1)

13)
Toledo Pipe Threading Machine Co
Toledo 3 Ohio (2-8-9-10-14)
Toledo 3 Ohio (2-8-9-10-14)
Velocity Power Tool Co 201 N Braddock Ave
Pittsburgh 8 Pa (14)
Vickers Inc Tulsa Products Div 731 E First St
Tulsa 20 Okla (14)
Wachs (E H) Co 1525 N Dayton St Chicago 22
III (2-14-15)
Wagner Malieable Products Co 222 W Adams St
Chicago 6 III (2)
Wells Mfg Co 220 Ninth St San Francisco 3 Calif
(2)
Wheeler Mfg Ca Rows 84 Additional Control of the Color of the Color

Wheeler Mfg Co Ross Rd Ashtabula Ohio (2)

12D. MATERIALS HANDLING EQUIPMENT

1. Ladders
2. Scaffolds, work towers & platforms
3. Hoists
4. Lift trucks
5. Maintenance trucks
6. Hand trucks
7. Truck bodies & bins
8. Bins, cabinets, shelving & framing angle
9. Office & workshop trailers
10. Jecks & jack screws
11. Tool chests
12. Winches

A E Industrial Div Aircraft Armaments Inc P 0
Box 6853 Baltimore 4 Maryland (3)
Allen Iron & Steel Co P 0 Box 550 Norristown
Pa (6-8)
Allied Mfg & Sales Co 3101 W Grand Ave Chicago
22 Ili (1-2-3-4-5-6)
Allis-Chairners Mfg Co 930 S 70th St Milwaukee 1
Wis (4)
American Pulley Co 4200 Wisahirkon Ave Bhila Wis (4)
American Pulley Co. 4200 Wisahickon Ave Phila
29 Pa (4-5-6-9)
Automatic Transportation Co. 101 W 87th St. Chicago 20 III (4-6)
Baker-Roos Inc. 602 W McCarty St. Indianapolis 6
Ind. (2) Ballymore Co Lincoln & Garfield Aves West Chester Pa (1-2) Pa (1-2)

Pa (1-2)

Beaver-Advance Corp 12th & Factory Sts Ellwood

City Pa (2)

Bernard-Franklin Co Inc Frankford & Torresdale

Aves Philadelphia 24 Pa (6-8)

Bruhn Steel Products Co 300 E Dunes Highway

Chesterten Ind (11)

Building Service Co 4923 18th Ave S Minneapolis

17 Minn (2)

Case (J I) Co Racine Wis (4)

Charles Machine Works Inc P O Box 66 Perry

Okla (2)

Chester Hoist Div National Screw & Mfg Co Lisbon Case (J I) Co Racine Wis (4)
Charles Machine Works Inc P 0 Box 66 Perry
Okla (2)
Chester Hoist Div National Screw & Mfg Co Lisbon
Ohio (3)
Chisholm-Moore Hoist Div - Columbus McKinnon
Corp 6072 Fremont Ave Tonawanda N Y (3)
Clark (George P) Div Cragin & Wilkins Co Inc
Flichburg Mass (4-6)
Coffing Hoist Div Duff-Norton Co Danville III (3)
CraneVeyor Corp 1240 S Boyle Ave Los Angeles
23 Calif (3)
Dayton Safety Ladder Co 2337 Gilbert Ave Cincinnati 6 Ohio (1)
Dayton Safety Ladder Co 2337 Gilbert Ave Cincinnati 6 Ohio (1)
Detroit Hoist & Machine Co 8292 Morrow St Detroit 11 Minc (3)
Di-Acro Corp 427 Eighth Ave Lake City Minn (6)
Economy Engineering Co 4511 West Lake St Chicago 24 III (1 thru 5)
Ederer Engineering Co 2943 1st Ave S Seattle 4
Wash (3)
Eloco Div F L Jacobs Co 4235 W North Ave Chicago 39 III (1-2-5)
Electro Lift Inc 204 Sergeant Ave Clifton NJ (3)
Eliwell-Parker Electric Co 4319 St Clair Ave
Cleveland 3 Ohio (4)
Evilland St Minneapolis 18 Minn (4)
F W D Corp 105 E 12 St Clintonville Wils (5)
Fairbanks Co 393 Lafayette St NY 3 NY (6)
Fiex Angle Corp 3760 Oakwood Ave (P O Box
418) Youngstown 1 Ohio (8)
Gar Wood Industries Inc Wayne Mich (4)
Goshen Churn & Ladder Inc Goshen Ind (1-2)
Hameth (Walter) Co 2840 4 Nave So Minneapolis Minn (8)
Hamilton Ohio (8)
Gar Wood Industries Inc Wayne Mich (4)
Goshen Churn & Ladder Inc Goshen Ind (1-2)
Hameth (Walter) Co 2840 4 Nave So Minneapolis Minn (8)
Hamitton Ohio (5-6-7-9)
Handy Angle Div Lug-All Co 355 Lancaster Ave
Haverford Pa (3)
Hanos Chern & Cleveland 35 Ohio (1-7)
Hyster Co 2902 N E Clackanas St Portland 8
Ore (4)
Ore (4)
Ore (4)
Ore (5) Hyster Co 2902 N E Clackanas St Portland 8 Ore (4) Ingersoli-Rand Co 11 Broadway NY 4 NY (3) Inland Ladder Co 1914 Stanford St Alameda Calif (1) Inland Ladder Co 1914 Stanford St Alameda Calif (1) International Trailer Co Inc 725 North Point Rd Baltimore 6 Md (9)
King Mfg Corp 3146 N Chicago Ave Chicago 22 III (3)
Lantz Mfg Co Inc Valparaiso Ind (3)
Leabaw Mfg Co 65 Wayne Ave Youngstown 2 Ohio (5-6)
Lebaw Mfg Co 16 Wayne Ave Youngstown 2 Ohio (5-6)
Lefourneau (RG) Inc 2399 S MacArthur Langview Tex (3)
Lift Trucks Inc 2425 Spring Grove Ave Cincinnati 14 Ohio (4-6)
Link-Bett Co Prudential Plaza Chicago 1 III (3-4-5-6-8-9)
Lint Cilyde WJ 2323 W 18 St Chicago 8 III (11) Lint (1) (1)
Manning Maxwell & Moore Inc 250 E Main St
Stratford Conn (3)
Massey-Ferguson Industrial Div Massey-Ferguson
Inc 1009 S West St Wichita 13N Kans (4)
McCabe-Powers Body Co 5900 N Broadway St
Louis 15 Mo (1-3-5-7)
Mercury Mfg Co 4700 W Division St Chicage
III (4-6) Mercury Mf Moto-Truc Co 1953 E 59 St Cleveland 3 Ohio (4)
Nuting Truck and Caster Co 1201 W Division St
Faribault Minn (6)
Orangeville Mfg Co Orangeville Pa (6)
Patent Scaffolding Co Inc 38-21 12th St LIC 1
NY (1-2)
Penco Div Alan Wood Steel Co 200 Brower Ave
Oaks Pa (8)
Proto Tool Co Box 3519 Terminal Annex Los
Angeles 54 Callf (11)
Pucel Enterprises Inc 3746 Kelley Ava Clevaland (4) Angeles 54 Callf (11)
Pucel Enterprises Inc 3746 Kelley Awe Cleveland
14 Ohio (6-8)
Reading Crane & Holst Corp 2100 Adams St
Reading Pa (3)
Revolvator Co 2000 86th St North Bergen NJ (4)
Robbins & Myers Inc 1345 Lagonda Ave Spring-field Ohio (3)
Rol-Away Truck Mfg Co Inc 6143 S E Foster Rd Portland 6 Ore (5)

Round (David) & Son Inc Box 9557 Cleveland 39 Ohio (3-12) Safway Steel Products Inc 6228 W State St Milwaukee 13 WIs (2) Sasgen Derrick Co 3101 Grand Ave Chicago Dasgen Derrick Co 3101 Grand Ave Chicago III (3)

Scranton Aluminum Mfg Co 419 S Wyoming Ave Scranton Pa (1)

Scf-Lifting Piano Truck Co 423 N Main St Find-lay Ohlo (3-6)

Shaw-Box Crane & Holst Div Manning Maxwell & Moore Inc Muskegon Mich (3)

Shure Mfg Corp 1601 S Hanley Rd St Louis Mo (8)

Silent Hoist & Crane Co 841-63rd St Brooklyn 20 NY (3-4)

South River Mg (1)

South River Metal Products Co Inc 377 Turnpike South River Mg (1)

South River Metal Products Co Inc 377 Turnpike South River Mg (1)

South River Metal Products Co Inc 377 Stevens Appliance Truck Co Norton Rd (P O Box 897) Augusta Ga (6)

Swett (A L) Iron Works 166 Glenwood Ave Medina NY (10) Sasgen (3) Telsta Corp 2900 Spring St Redwood City Calif (2) Tempio (10) eton Kenly & Co Gardner Rd Broadview III Up-Right Inc. Up-Right Scaffolds Div 1013 Pardee St. Berkeley 10 Calif (1-2-3) Utility Body Co. 1530 Wood St. Oakland 7 Calif (7) Vickers Inc Tulsa Products Div 731 E First St Tulsa 20 Via (12) Waco Mfg Co 5250 W 130 St Cleveland 30 Ohio (2) Wellington Machine Co 133 De Wolf St Welling-ton Ohio (1) ton Ohio (1)
Werner Co (R R) inc P O Box 580 Greenville Pa (1-2) (1-2)
Wright Hoist Div American Chain & Cable Co Inc
Franklin & Hay Sts York Pa (3)
Yale & Towne Mfg Co 11000 Roosevelt Blvd
Philadelphia 15 Pa (3-4-5-6)
Yeats Appliance Dolly Sales Co 2124 N 12th St
Milwaukee 5 Wis (6)

### 12E. ARMATURE & STATOR TOOLS &

Air gap gauges
 Dynamic balancers
 Static balancers
 Holders & stands
 Brush seaters
 Commutator grinding, cutting, scraping & filing equipment
 Wedge levelers
 Bushing reamers
 Bush tension scales

Allen Electric and Equipment Co 2101-2117 N
Pitcher St Kalamazoo Mich (7)
Annis (R B) Co 1101 N Delaware St Indianapolis
2 Ind (2) 2 Ind (2)
Associated American Winding Machines Inc 750 St
Ann's Ave New York 55 NY (5)
Co-operative Utilities Co Inc 4637-39 Mulberry St
Phila 24 Pa (6-7)
DeWalt Inc Fountain Ave Lancaster Pa (7)
Foredom Electric Co Inc Bethel Conn (7)
General Electric Co Apparatus Sales Schenectady
5 N Y (2)
Gisholt Machine Co 1245 E Washington Ave Madison 10 Wis (2)
Heller Tool Co Heller Drive Newcomerstown Ohlo
(7)

Holiub Industries Inc (4-7)

Hullhorst Tools Inc 227 Wamba Ave (P 0 Box 3344) Toledo 7 Ohio (7)

DEAL INDUSTRIES INC 5136 Park Ave Sycamore III (6-7)—ADV PG 103

Martindale Electric Co 1393 Hird Ave Cleveland 7 Ohio (1-6-7-8-9-10)

Micro Balancing Inc 191 Herricks Rd Garden City Pk NY (2)

Potter & Rayfield Inc P 0 Box 1042 Atlanta Ga (4-5)

Raydyne Corp 2715 S Fourth St (P 0 Box 1147) Industries Inc 442 Elm St Sycamore III (4-5)
Raydyne Corp 2715 S Fourth St (P O Box 1147)
Springfield III (2)
Simonds Saw and Steel Co 470 Main St Fitchburg Mass (7)
Sittler Corp 18 N Ada St Chicago 7 III (6-7)
Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (7) Waveland Electric Co p D Box 97 Glenford NY (2)
Waveland Electric Co 5542 N Ashland Ave Chicago
40 III (6-7)
Westinghouse Electric Corp P D Box 2278 Pittsburgh 30 Pa (2)

12F. COIL TOOLS & EQUIPMENT

Checks
 Heads
 Impregnators
 Lacing hooks
 Spreaders
 Tampers
 Winders & tapers
 Forms
 Bobbins

Armature Coll Equipment Inc 2605 Vega Ave Cieveland 13 Ohio (5-7-8)
Associated American Winding Machines Inc 750 St Ann's Ave New York 56 BY (7)
Chapman (P E) Electrical Works Inc 1820 Chouteau Ave St Louis 3 Mo (7)
Columbia Products Inc Wrightsville Pa (7)
Columbia Products Inc Urightsville Pa (7)
Continental Electric Co 1234 S Prairie Ave (P O Box 895) Hawthorne Calif (2)
Crown Industrial Products Co 713 Amsterdam St Woodstock III (6-7)
Dage Television Div Thompson Products Inc Michigan City Ind (5)
Dayis Electric Co 28 Parker St Wallingford Conn (7)
[7]
[7]
[7]
[7]
[7]
[8]

Electro Devices Inc 580 Main St Wilmington Mass (7)

(7)
Emerson Plastics Corp 1383 Seabury Ave Bronx 61 NY (8-9)
Harder (Donald C) Co 2580 K St San Diego 2
Calif (7)
Leesona Corp P O Box 1605 Providence 1 RI (7)
Martindale Electric Co 1383 Hird Ave Cleveland
7 Ohio (1.6-7)
Maryland Lava Co Box 127 Bel Air Md (8)
Potter & Rayfield Inc P O Box 1042 Atlanta Ga (2-3-7-8)
Stokes (F J) Corp 5500 Tabor Rd Philadelohia

(2-3-7-8) Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Pa (3) Waldman (John J) Co 477 Atlantic Ave Brooklyn 1.7 NY (7) Waveland Electric Co 5542 N Ashland Ave Chicago 40 III (1)

#### 12G. INSULATION TOOLS

Cutters
 Edgers, folders, formers & turners
 Wedge drivers & removers

Crown Industrial Products Co 713 Amsterdam St Woodstock III (2) Woodstock III (2)
Klein (Mathias) & Sons 7200 McCormick Rd Chi-cago 45 III (1)
Magrinda Electric Chicago 45 [II (1)
Martindale Electric Co 1383 Hird Ave Cleveland 7
Ohio (1-2-3)
Proto Tool Co Box 3519 Terminal Annex Los
Angeles 54 Calif (1)
Safety Live Line Tool Co 973 86th Ave Oakland
21 Calif (1)

#### 12H. SOLDERING TOOLS & EQUIPMENT

Guns, irons, pencils & machines
 Stands & holders
 Heaters
 Pots
 Torches
 Resistance-type soldering equipment

American Electrical Heater Co 6110 Cass Ave Detroit 2 Mich (1-6)
Bernz (Otto) Co Inc 740 Driving Park Ave Rochester 13 MV (5)
Chapman (P E) Electrical Works Inc 1820 Choteau Ave St Louis 3 Mo (1)
Clements Mig Co 6650 S Narragansett Ave Chicago 38 III (5)
Cummins Portable Tool Div John Oster Mig Co 5055 N Lydell Ave Milwauke 17 Wis (1)
Dockson Corp 3839 Wabash Ave Detroit 6 Mich (5)

(5) Electric Materials Co Box 390 North East Pa (1) Electric Soldering Iron Co Inc West Elm St Deep River Conn (1-4) General Electric Co Apparatus Sales Schenectady 5 NY (1-4) God-All Electric Mg Co 112 W First St Ogalia

Ideal Industries Inc 5136 Park Ave Sycamore III
(1)

Ideal Industries Inc 5130 Park Awe Sycamore III
(1)
Insto-Gas Corp 998 E Woodbridge St Detroit 7
Mich (1-3-5)
Kwikheat Mfg Co 3732 San Fernando Rd Glendale
4 Calif (1-2)
Lenk Mfg Co Franklin Ky (1-5)
Lint (Clyde W) 2323 W 18 St Chicago 8 III (4)
Luma Electric Equipment Co 1607 Coining Drive
(P 0 Box 132) Toledo Ohio (1)
Lyon Rural Electric Co 2075 Moore St San Diego
12 Calif (4)
Mine Safety Appliances Co 201 N Braddock Ave
Pittsburgh 8 Pa (5)
Mitchell Industries Inc Box 17 Municipal Airport
Mineral Wells Tex (1)
Mational Specialties Co Inc 1902 Howell St Fort
Wayne 7 Ind (1)
Prepo Corp Edgerton Wis (5)
Roche (Paul C) Co Inc 11 Park Pl New York 7
NY (1)
Smith Welding Equipment Corp 2633 4th St S E
Minneapolis 14 Minn (5)

Smith Welding Equipment Corp 2633 4th St S E Minneapolis 14 Minn (5)

Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (1) Characteristic Co 53 N Chestnut St Ravenna Ohio (4) Triton Mfg Co Inc East Haddam Conn (1) Turner Brass Works 821 Park Ave Sycamore III

Ungar Electric Tools Div of Eldon Industries Inc 1475 E El Segundo Bivd Hawthorne Calif (1) Vulcan Electric Co 88 Holten St Danvers Mass (1-2-3-4)

(1.2-3-4)
Waage Electric Inc 720 Colfax Ave Kenilworth
NJ (4)
Wall (P) Mfg Co P 0 Box 71 Grove City Pa
(1.2-3)
Weller Electric Corp 601 Stone's Crossing Rd
Easton Pa (1)
Wen Products Inc 5808 Northwest Highway Chicago 31 III (1)
Wilder Mfg Co Inc Mechanic St & Erie Railroad
Port Jervis NY (2)

### 12J. MISCELLANEOUS SHOP MACHINERY &

1. Arbor presses
2. Metal benders
3. Metallizers
4. Demagnetizers
5. Plating equipment
6. Etchers & engravers
7. Sprayers
8. Gear & bearing installers & extractors
9. Melting pots, tanks & kettles
10. Electric weders & accessories
11. Vacuum cleaners & portable blowers
12. Lamp disposal units
13. Magnetizers
14. Nameplate stamping machines

Acme Electric Heating Corp 99 Reading St Boston 19 Mass (9)
Acro Welder Mfg Co 1719 W St Paul Ave Milwaukee 3 Wis (10)
Acromark Co 320 Morrell St Elizabeth 4 NJ (4-6)
Aeroil Products Co Inc 69 Wesley St South Hackensack NJ (9)
American Floor Machine Co 516 S St Clair St Toledo 3 Ohio (11)
American Pipe Tool Co 4856 W Kinzle St Chicago 44 III (9)
American Yacsum Co 8100 N Ridoseway Skokie III

merican Vacuum Co 8100 N Ridgeway Skokie III

(11)
Anderson (Albert & J M) Mfg Co 289 A St Boston
10 Mass (2)
Annis (R B) Co 1101 N Delaware St Indianapolis
2 Ind (4-6-13)
Armstrong-Bray & Co 5366 Northwest Highway
Chicago 30 III (8)
Auto Arc-Weld Mfg Co 9615 Meech Ave Cleveland
5 Ohio (10)
Sirgles | Products 350 N Haistand Pasadena Calif

Birdsell Products 350 N Halstead Pasadena Calif (10)

(10)
Black & Decker Mfg Co Towson 4 Md (9-11)
Blackhawk Industrial Div Blackhawk Mfg Co 13320
W Reichert P! Butler Wis (8)
Breuer Electric Mfg Co Chicago 40 Hi (11)
Burgess Vibrocrafters Inc Grayslake III (6)
Chadsey Corp P O Box 1858 Hartford 1 Conn (12)

Clements Mfg Co 6650 S Narragansett Ave Chi-cago 38 111 (11) Cool-Amp Co 8603 W 17 Ave Portland 19 Ore (5)

Coper (D C) Co 1467 S Michigan Ave Chicago 5 111 (9)
Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (9)
Coppus Engineering Corp 344 Park Ave Worcester 10 Mass (11)
Crozier Machine Tool Co 684 N Prairie Ave Hawthorne Callf (8)
Dake Corp 724 Robbins Rd Grand Haven Mich (1)
DeVilbiss Co 300 Phillips Ave Toledo 1 Ohio (7)
Di-Acro Corp 427 Eighth Ave Lake City Minn (2)
Ohio (6)
Doyle Vacuum Cleaner Co 234 Stevens St S W

Ombo Vot Doyle Vacuum Cleaner Co 234 Stevens St S W Grand Rapids Mich (11) Easco Products Inc P O Box 587 Ypsilantl Mich (4-6-13)

(9-0-17)
Eisler Engineering Co Inc 750 E 13 St Newark 3
NJ (10)
Electric Arc Inc 152 Jeliff Ave Newark 8 NJ
(10) St Chicago 6 III (7)
Electro-Graphic Graver Co P 0 Box 265 Toledo 1
Ohio (6)
Erie Tool Works 12th & Liberty Sts Erie Pa

Erie (9)

(9)
Ewald Instruments Box 124P Kent Conn (10)
Federal Machine & Welder Co 1745 Overland Ave
N E Warren Ohio (10)
General Electric Co Apparatus Sales Schenectady
5 NY (9)

General Floorcraft Inc 3630 Rombouts Ave Bronx 66 NY (11)
Graham Mig Corp 152 Second Ave Needham Hts 94 Mass (10)
Guyan Machinery Co Inc Box 150 Logan W Va (10) Harnischfeger Corp 4400 W National Ave Milwaukee 46 Wis (10)
Hesse Products Co 3800 N Virginia St Reno
Nev (5)
Hobart Bros Hobart Square Troy 1 Ohio (10)
Hollub Industries Inc 442 Elm St Sycamore III
(11)

Hossfeld Mfg Co 460 W Third St Winona Minn DEAL INDUSTRIES INC 5136 Park Ave Sycamore III (4-6-11)—ADV PG 103
Insto-Gas Corp 998 E Woodbridge St Detroit 7
Mich (9) Vacuum Cleaner Mfg Co Dover Ohio Invincible Vacuum Cleaner Mfg Co Dover Ohlo (11)

Kent Co Inc 359 Canal St Rome NY (11)
K(Rim (Leo) Electronics 2404 S LaBrea Awe Los Angeles 16 Calif (4-13)
Laduby Co Inc Boston Post Rd (P 0 Box 88)
Branford Conn (12)
Lenco Inc Beston Post Rd (P 0 Box 88)
Branford Conn (12)
Lenco Inc Beston Post Rd (P 0 Box 88)
Lama Electric Co 22801 St Clair Ave Cleveland 7 Ohlo (10)
Luma Electric Equipment Co 1607 Coining Drive IP 0 Box 132) Toledo Ohio (4-6)
Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohlo (14-6-8-11)
Milor Instrument Co 80 Trowbridge St Cambridge 38 Mass (6)
Mild-States Welder Mfg Co 6025 S Ashland Ave Chicago 36 III (10)
Miller Electric Mfg Co Inc 718 S Bounds St Appleton Wis (10)
Morrow Co 400 W Madison St Chicago 6 III
(11)
Mational Electric Welding Machines Co 1846-1916 (11)
National Electric Welding Machines Co 1846-1916
N Trumbull St Bay City Mich (10)
National Super Service Co 1946 N 13 St Toledo
Ohio (11)
New England Carbide Tool Co Inc 55 Commercial
St Medford 55 Mass (2)
Newage Industries Inc 22 York Rd Jenkintown
41 Pa (6)
Owatonna Tool Co 178 N Cedar St Owatonna 41. Pa (6)
Watonna Tool Co 178 N Cedar St Owatonna
Minn (1-8)
Pedrick Tool & Machine Co 3640 N Lawrence St
Phila 40 Pa (2)
Peer Inc 1220 Milton St Benton Harbor Mich
(10)

Ga (2)
Precision Welder Mfg Co 2483 Greenleaf Ave
Elk Grove Village III (10)
Pullman Vacuum Cleaner Corp 25 Bulck St Boston
15 Mass (11)
Radio Frequency Laboratories Inc Boonton NJ
(4.13) Radio Frequency Laboratories Inc Boonton NJ (4-13)
Ramset Fastening System Winchester-Western Div Olin Mathieson Chemical Corp 289 Winchester Ave New Haven 4 Conn (30)
SPAPID ELECTROPLATING PROCESS INC 1414
S Wabash Ave Chicago 5 III (5)—ADV PG 129
Rawlplug Co Inc 212 Petersville RM New Rochelle NY (5)
Rawtheon Mfo Co. Commercial Annaratus & Systems

Pines Engineering Co Inc 601 Walnut St Aurora III (2) otter & Rayfield Inc P 0 Box 1042 Atlanta Ga (2)

NY (5)
Raytheon Mfg Co Commercial Apparatus & Systems
Div 100 River St Waltham 54 Mass (10)
Rex Welder Co 1200 Militon St Benton Harbor yth. Div Weld Rex Welger Mich (10) Bros Inc 4915 W 67 St Chicago 38 III Scientific Electric Inc 105-109 Monroe St Gar-field NJ (10) Shrader (F W) Co 11623 S Broadway Los An-geles 61 Calif (4-13) Snap-On-Tools Corp 8028 28th Ave Kenosha Wis Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (1-8)
Spencer Turbine Co 486 New Park Ave Hartford 6 Conn (11)
Sta-Warm Electric Co 53 N Chestnut St Ravenna Ohio (9)
Stokes (F J) Corp 5500 Tabor Rd Philadelphia 20 Pa (3)
Swett (A L) Iron Works 166 Glenwood Ave Medina NY (9)
Taylor-Winfield Corp 1052 Mahoning Ave N W Warren Ohio (10)
Trent Inc 201-299 Leverington Ave Phila 27 Pa (9)
Trindl Products Ltd 1807-11 S Clark St Chicago Pa (9) Trindl Products Ltd 1807-11 S Clark St Chicago 16 III (10)

16 III (10)
Truco Masonry Drilling Div Wheel Trueing Tool
Co 3200-3220 W Davison Ave Detroit 38 Mich
(11) Turner Brass Works 821 Park Ave Sycamore III (9)
Universal Electric Sales Corp 3537 Lee Rd Cleve-land 20 Ohio (10)
Versabar Corp 14 Whyte St Jersey City NJ (10)
Vickers Inc Electric Products Div 1847 Locust St St Louis 3 Mo (10)
Vulcan Electric Co 88 Holten St Danvers Mass (9) Waage Electric Inc 720 Colfax Ave Kenilworth NJ (9) Walco Electric Co 131 Blackston St Providence 1 RI (8)

1 RI (8)
Welduction Corp 19400 W Eight Mile Rd P 0
Box 146 Southfield Mich (10)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (10-11)

12K. FASTENING DEVICES

Bolt-sealing & screw-anchoring comp
 Expansion bolts, shields & anchors
 Concrete inserts
 Toggle bolts
 Powder-actuated fastening tools
 Hammer-actuated fastening tools
 Equipment seals and sealing devices
 Threaded inserts

APM Corp 41 Honeck St Englewood NJ (7)
Ackerman-Johnson Co 625 W Jackson Blvd Chicago 6 III (2-3-4)
American Sealants Co 705 N Mountain Rd Hartford 11 Conn (1)
Apex Bolt Products Co 452-458 N Claremont Ave Chicago 12 III (2-4)
ARRO EXPANSION BOLT CO P 0 Box 388 Marion Ohio (2-4)—ADV PG 90
Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (8)
BLACKHAWK INDUSTRIES 250 S MAIN ST

Bergen Laboratories Inc 60 Spruce St Paterson 1 NJ (8)

\*\*SLACKHAWK INDUSTRIES 250 S MAIN ST Dubuque Iowa (2)—ADV PG 88

\*\*Bulldog Div Gregory Industries Inc Toledo Ave & East 28 St Lorain Ohio (2-4)

Chicago Expansion Bolt Co 1338 W Comcord Pl Chicago 22 Ill (2-3-4-5)

Cleveland Trencher Co 20100 St Clair Ave Cleveland 17 Ohio (3)

Cope (T J) Div Rome Cable Corp Third & Walnut Sts Collegeville 5 Pa (3)

\*\*DIAMOND EXPANSION BOLT CO INC Garwood NJ (2-4)—ADV PG 124

Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio (2-5)

Fastway Fasteners Inc 1676 E 28 St Lorain Ohio (2-6)

Gateway Engineering Co 3233 W Grand Ave Chicago 51 Ill (3)

Hilti Inc 73 Southfield Ave Stamford Conn (5-6)

Holub Industries Inc 442 Elm St Sycamore Ill (2-2-4-8) (2-3-4) Holub Industries Inc 442 Elm St Sycamore III Hubbard & Co 6301 Butler St Pittsburgh 1 Pa (2) Pa (2)
International Seal & Knot Protector Co 58-02 37th
Ave Woodside 77 NY (6)
Jordan Industries Inc 3030 N W 75 St Miami 47
Fla (2-5-4) Jordan Industries Inc 3030 N W 75 St Miami 47
Fla (2-3-4)
Kirel Inc CPO Box 387 Kingston NY (2-3)
Leibfried (C H) Mfg Corp 95-101 Guernsey St
Brooklyn 22 NY (3)
Mastercraft Plastics Co Inc 95-01 I50th St
Jamaica 35 NY (2)
Mine Safety Appliance Co 201 N Braddock Ave
Pittsburgh 8 Pa (4-5)
Molly Corp 230 N Fifth St Reading Pa (2)
Mult-A-Frame Corp 6401 Epworth Blvd Detroit
10 Mich (3)
National Lead Co 111 Broadway NY 6 NY (2)
Omark Industries Inc 9701 S E McLoughlin Blvd
Portland 22 Ore (5-6)
PAINE CO 6 Westpate Rd Addison III (2-4)—
ADV PG 94
PHILLIPS DRILL CO U S 12 Michigan City Ind
(2)—ADV PG 131
Ramset Fastening System
Olin Mathieson Chemical Corp 289 Winchester
Ave New Haven 4 Conn (4-5)
Rawjolyg Co Inc 212 Petersville Rd New Rochelle
NY (2-4)
Remington Arms Co Inc 939 Barnum Ave Bridgeport 2 Conn (5)

NY (2-4)

Remington Arms Co Inc 939 Barnum Ave Bridgeport 2 Conn (5)

Security Insert Co 1300 Arch St Phila 7 Pa (3)

Southco Div South Chester Corp Lester Pa (2)

Star Expansion Mountainville NY (2-3-4)

STEEL CITY ELECTRIC CO 1207 Columbus Ave
Pittsburgh 33 Pa (3)—ADV PG 104

U S Expansion Bolt Co State St & PRR York
Pa (2-4-6)

Pa (2-4-6)

Velocity Power Tool Ca 201 N Braddock Ave Pa (2-4-6) Itolity Power Tool Co 201 N Braddock Ave Pittsburgh 8 Pa (5) ahlund (M Paul) Mechanical Laboratory P 0 Box 16 Grant Iowa (3)

12L. MISCELLANEOUS ELECTRICIANS' TOOLS

1. Hammers, pliers, screwdrivers, scissors,

etc.
2 Tool pouches & holders
3. Fuse pullers
4. Lamp changers, incandescent
5. Lamp changers, fluorescent
6. Test leads & clips
7. Contact burnishers
8. Wrenches, torque & impact

Adre Co 8980 W Hawthorne Lane Hales Corners 3 Wis (7) Aircraft Specialties Inc 415 Howard St Lapeer Mich (1) Mich (1)

Benjamin Div Thomas Industries Inc 207 E
Broadway Louisville 2 Ky (4)

Billings & Spencer Co 1 Laurel St Hartford 1
Conn (1)

Black & Decker Mfg Co Towson 4 Md (8)

Blackhawk Industries 250 S Main St Dubuque
Iowa (1)

Bodendleck Tool Co P 0 Box 499 Taylorville III
(3)

Bonney Forge & Tool Works 2400 Rockhill Rd (North) Alliance Ohio (1)
Bridgeport Hardware Mfg Corp Schofield Ave Bridgeport 5 Conn (1)
Capewell Mfg Co 60-70 Governor St Hartford 2 Conn (1)
Chadsey Corp P O Box 1858 Hartford 1 Conn (4-5) (4-5)
Champion DeArment Tool Co South Main St
Meadville Pa (1)
Chance (A B) Co 210 North Allen St Centralia
Mo (3) Chicago P NY (8) Pneumatic Tool Co 6 E 44 St NY 17 NY (8)
mmercial Enclosed Fuse Co of NJ 6812 Polk
St Guttenberg NJ (3)
escent Tool Co 200 Harrison St Jamestown NY
(1) Co Cresce (1) (1)
Dante Electric Mfg Co Bantam Conn (3)
Diamond Tool and Horseshoe Co 4702 Grand Ave
Duluth 7 Minn (1)
Dreier Brothers Inc 7301 Woodlawn Ave Chicago
19 III (1) Dreier Protects
19 III (1)
Duro Metal Products Co Kildare & Schubert Sts
Chicago III (1)
Eagle Electric Mfg Co Inc 23-10 Bridge Plaza
South Long Island City 1 NY (3)
Eastern Specialty Co 3617 N 8th St Phila 40
Pa (6) Pa (b)
Electro Dynamics Corp 4917 St Elimo Ave
Bethesda 14 Md (1)
Erie Tool Works 12th & Liberty Sts Erie Pa Forsberg Mfg Co 125 Seaview Ave Bridgeport 1 Conn (1) Conn (1)
General Hardware Mfg Co Inc 80 White St NY
13 NY (1)
General Scientific Equipment Co Limekiln Pike &
Williams Ave Philadelphia 50 Pa (2)
Greenlee Tool Co 2136 Twelfth St Rockford III
(1) Heller Tool Co Heller Drive Newcomerstown Ohio olub Industries Inc 442 Elm St Sycamore III Holi Hunter Tools 9851 Alburtis St Santa Fe Springs Calif (1-2) Ideal Industries Inc 5136 Park Ave Sycamore III (3) Industrial Devices Inc Edgewater 19 NJ (6)
Irwin Auger Bit Co 92 Grant St Wilmington Ohio
(1) Kearney (James R) Corp 4236 Clayton Ave St Louis 10 Mo (3) 10 Mo (3)
Kedman Co 233 S Fifth West St Salt Lake City
Utah (1)
Ket Too Co 5055 Madison Rd Cincinnati 27

\*\*ELEIN (MATHIAS) & SONS 7200 McCormick Rd
Chicago 45 III (1-2)—ADV PG 106
Kranuter & Co Inc 585 18th Ave Newark 3 NJ

Kraeuter & Co Inc 585 18th Ave Newark 3 NJ (1)

(1)

Kraeuter & Co Inc 585 18th Ave Newark 3 NJ (1)

Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1-3-6)

McGill Mfg Co Inc Valparaiso Ind (4)

McGill Mfg Co Inc Box 16 Hudson NY (1)

Meteor Mfg Corp Emporium Pa (1)

Miller Equipment Co Inc 13th & New Streets Franklin Pa (1-2)

Millers Falls Co 57 Wells St Greenfield Mass (1)

Millers Electric Tool Corp 5368 W State St Millers Falls Co 57 Wells St Greenfield Mass (1)

Mueller Electric Co 15556 E 31 St Cleveland 14 Ohio (6)

Oxwall Tool Co Box 5926 Milwaukie P O Portland 22 Ore (1)

P& C Tool Co Box 5926 Milwaukie P O Portland 22 Ore (1)

Proto Tool Co Box 3519 Terminal Annex Los Angeles 54 Calif (1-2)

Rich (Phil) Fan Mfg Co Inc 2900 Caroline Houston 4 Tex (4-5)

Rite-O-Lite Co 308 E Washington Blvd Los Angeles Calif (4)

Rodale Mfg Co Inc 6th & Minor Sts Emmaus Pa (4)

Seeger-Williams Inc 4 Norman St Bridgeport 5 Conn (3)

(4)
Seeger-Williams Inc 4 Norman St Bridgeport 5
Conn (3)
Shallcross Controls Inc
waukee 8 Wis (1)
Simpson Electric Co 5200 W Kinzle St Chicago
44 Ill (6)
Sittler Corp 18 N Ada St Chicago 7 Ill (6)
Skil Corp 5033 Eiston Ave Chicago 30 Ill (1)
Slaughter Co College & Young Sts Pigua 5 Ohio Tec Imports 15001-03 Galifa St Van Nuys Calif (2-4)

Tho Power Tool Co 175 N State St Aurora III (B)
Tilden Tool Mfg Co 209 Los Molinos San Cle-mente Calif (3)
Truco Masonry Drilling Div Wheel Trueing Tool Co 3200-3220 W Davison Ave Detroit 38 Mich (1-2-3)

Wallace & Tiernan Inc 25 Main St Belleville NJ (4) Waveland Electric Co 5542 N Ashland Ave Chicago 40 III (7) Wilde Tool Co Inc Hiawatha Kans (1) Williams (J H) & Co 400 Vulcan St Buffalo 7 Williams NY (1)

Xcelite Inc Thorne Ave at Bank St Orchard Park NY (1)

#### 12M. CUTTING & DRILLING TOOLS

Portable electric drills & saws
 Hand drilling & boring tools
 Masonry drills
 Circle cutters
 Hole saws
 Metal cutters & shears
 Star drills
 Plaster groovers & cutters
 Hammers, power driven

Albertson & Co Inc 2999 Floyd Blvd Sioux City Iowa (1-2) Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forks ND (1)

Grand Forks ND (1)

ARRO EXPANSION BOLT CO P 0 Box 388 Marion Ohio (2)—ADV PG 90

Beverly Shear Mfg Co 3023 W 111 St Chicago 43 111 (6)

Billings & Spencer Co 1 Laurel St Hartford 1 Conn (6)

Black & Decker Mfg Co Towson 4 Md (1-5-6-9)

Capewell Mfg Co 60-70 Governor St Hartford 2 Conn (4)

Chicago Expansion Bolt Co 1338 W Concord Pl Chicago 22 III (3-7) Chicago Pneumatic Tool Co 6 E 44 St NY 17 NY (1-3-7-9)

Clipper Mfg Co 2800 Warwick Kansas City 8 Mo (1-2-3-5)

(1-2-3-5)
Cummins Portable Tool Div John Oster Mfg Co
5055 N Lydell Ave Milwaukee 17 Wis (1)
DeWalt Inc Fountain Ave Lancaster Pa (1-6)
Di-Acro Corp 427 Eighth Ave Lake City Minn (6)
Diamond Expansion Bolt Co Inc Garwood NJ (2)
Easco Products Inc P O Box 587 Ypsilant! Mich
(6)

Electric Materials Co Box 390 North East Pa (7)

(1)

Equipment Corp of America 1537 Superior Ave Cleveland 14 Ohio (2-3)

Erwood Inc 1770 Berteau Ave Chicago 13 III (4)
Gaston Power Tools 999 Ridge Rd Thornton III
(1)

General Hardware Mfg Co Inc. 80 White St. New York 13 NY (2-4) Greenlee Tool Co. 2136 Twelfth St. Rockford III (2)

& Sons Inc 950 Kent Ave Brooklyn 5 NY (3)

Hayden Twist Drill Co Manila Ark (2)
Holub Industries Inc 442 Elm St Sycamore III
(3-7) I-Rand Co 11 Broadway New York 4 NY

Interstate Drop Forge Co Special Products Div 4051 N 27th St Milwaukee 16 Wis (6) Irwin Auger Bit Co 92 Grant St Wilmington Ohio (2)

(2) Jordan Industries Inc 3030 N W 75 St Miami 47 Fla (2-3) Kaweer Co Niles Mich (4) Kaweer Co Niles Mich (4) Kaweer Co Niles Mich (4) Cincinnati 27 Ohio (2) Kraeuter & Co Inc 585 18th Ave Newark 3 NJ (7)

(7) Clidseen of North Carolina Inc 1000 First St Hayesville NC (6) Lint (Clyde W) 2323 W 18 St Chicago 8 III (6) Mall Tool Co 25000 S Western Ave Park Forest III (1)

Martindale Electric Co 1383 Hird Ave Cleveland 7

Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (1) Mephisto Tool Co Inc. Box 16 Hudson NY (2) Milco Instrument Co 80 Trowbridge St Cambridge 38 Mass (4) Millers Falls Co 57 Wells St Greenfield Mass (1-5)

Milwaukee 8 Wis (1)

MISENER MFG CO INC 202-208 Walton St Syracuse 2 NY (5)—ADV PG 124

Newage Industries Inc 222 York Rd Jenkintown 41 Pa (1)

Paine Co 6 Vestgate Rd Addison III (2)

Pennsylvania Drilling Co Masonry Drill Div 1201

Banksville Rd Pittsburgh 16 Pa (2-3)

BYHILLIPS DRILL CO U S 12 Michigan City Ind (3)—ADV PG 131

Porter-Cable Machine Co 700 Marcellus St Syracuse 4 NY (1-9)

Portomag Inc 1521 E Nine Mile Detroit 20 Mich

Portomag Inc 1521 E Nine Mile Detroit 20 Mich

Producers and Distributors Inc. 1321 Hanover Ave Allentown Pa (1) Proto Tool Co. Box 3519 Terminal Annex Los Angeles 54 Calif (3-6-7) RCS Tool Corp. 227 E Front St. (P. 0. Box 661) Bloomington III (1)

Rawiplug Co Inc 212 Petersville Rd New Rochelle NY (2) Relton Corp 99 N Lotus Ave (P 0 Box 5546) Pasadena Calif (3) Robertson & Ruth 460 W Lake St Elmhurst III (6)

(6) Cancrete Drill Co 650 S Arroyo Parkway Pasadena 1 Calif (2) Shallcross Controls Inc 2217-21 N 31 St Milwaukee 8 Wis (1-2-4) Skil Corp 5033 Elston Ave Chicago 30 Ill (1-2-4)

Snap-On-Tools Corp 8028 28th Ave Kenosha Wis (1-2-4-6)
Stanley Power Tools Div Stanley Works New Britain Conn (1-6)
Star Expansion Mountainville NY (2)
Starrett (L S) Co Athol Mass (4)
Super Tool Co 21650 Hoover Rd Detroit 13
Mich (2)
Telsta Corp 2900 Spring St Redwood City Calif (1) Sn n-Tools Corp 8028 28th Ave Kenosha Wis

(1)

OTHOMPSON (HENRY G) & SON CO 277 Chapel
St New Haven 5 Conn (5)—ADV PG 127

Thor Power Tool Co 175 N State St Aurora III
(1.5-6-7-9)

Tilden Tool Mfg Co Inc 209 Los Molinos San
Clemente Calif (3)
U S Expansion Bolt Co State St & PRR York Pa
(1.2)

Wachs (F H) Co 1825 M Davido St Chicago Co Wachs (E H) Co 1525 N Dayton St Chicago 22 III (6)

III (6)
Waveland Electric Co 5542 N Ashland Ave Chicago
40 III (3-4-5)
Weller Electric Corp 601 Stone's Crossing Rd
Easton Pa (1)

Easton Pa (1)

WELLS MFG CORP 250 Service Rd Three Rivers Mich (6)—ADV PG 131

Wen Products Inc 5808 Northwest Highway Chicago 31 III (1)

Westinghouse Electric Corp P 0 8ox 2278 Pittsburgh 30 Pa (1-3-4-5-7-8)

Whitman & Barnes Div United Drill and Tool Corp 40600 Plymouth Rd Plymouth Mich (2)

Wiss (1) & Sons Co 33 Littleton Ave Newark 7 NJ (6)

Wodack Electric Tool Corp 4627 W Nivers Se Chi-

NJ 10) Wodack Electric Tool Corp 4627 W Huron St Chi-cago 44 III (1-2-8-9) Wyzenbeek & Staff Inc 223 N California Ave Chi-cago 12 III (1-4)

#### 12N. MACHINE ACCESSORIES

Vibration & shock-isolating mounts
 Static neutralizers & eliminators
 Oilers
 Nemeplates, decals & adhesive labels
 Display turntables
 Motor & generator mountings & brackets

Linemen's protective clothing & equipmen's listed under "Linemen's Tools & Accessories" in Section 12.

Acme Steel Co 135th St & Perry Ave Chicago 27 Acromark Co 320 Morrell St Elizabeth 4 NJ (4)
Atlantic Engravers Inc 52 Ocean Ave Amityville
NY (4)

NY (4)
Barry Wright Corp Barry Controls Eastern Div
700 Pleasant St Watertown 72 Mass (1)
Brady (W H) Co 727 W Glendale Ave Milwaukee 9
Wis (4)

Chicago Decalcomania Co 3310 Elston Ave Chicago 18 III (4) 10 11 (47)
Dickey-Grabier Co 10302 Madison Ave Cleveland
2 Ohio (4)
Doyle (J E) Co 1220 W 6th St Cleveland 13 Ohio
(2)

Fricson Mfg Co 1660 Hayden Ave Cleveland 12 Ohio (2) Eynon-Dakin Co 9900 Freeland Ave Detroit 27 Mich (3)

Mich (3)
Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY (4)
Labelon Corp Canandaigua NY (4)
National Decalcomania Corp 56 & Chestnut Sts Phila 39 Pa (4)
North Shore Nameplate Div Anodyne Inc 1270 N W 165 St North Miami Beach Fla (4)
Park Nameplate Co Inc 34-10 Linden Place Flushing NY (4)
Seton Name Plate Co Inc 50 Fitch St New Haven 15 Conn (4)
Spencer Industries 1508 N Mascher St Phila 22

Industries 1508 N Mascher St Phila 22 nan H) Co Inc 27 Park Pl New York Sticht (Herr

7 NY (2)
Topflight Corp 160 E 9th Ave York Pa (4)
United States Petroleum Co 104 Lakeview Ave
Clifton NJ (3)
United States Radium Corp Hanover Ave Morristown NJ (2-4)
Westline Products Div Western Lithograph Co 600
E Second St Los Angeles 54 Calif (4) NY (2)

### 12P. MOTOR & GENERATOR REPLACEMENT PARTS

3. Bearings & bushings
4. Brushes
5. Brush holders
6. Capacitors, motor-starting & running
7. Commutators, commutator bars & rings
8. Fields & windings
9. Flexible shafts
10. Frames
11. Shims
12. Terminal baxes
13. Slip rings Ahlberg Bearing Co 3025 W 47 St Chicago 32 III (3)
Allegheny Plastics Inc Rt 51 & Thorn Run Rd
Coraopolis Pa (3)
American Pulley Co 4200 Wissahickon Ave Phila
29 Pa (2)
Amplex Div Chrysler Corp P 0 Box 2718 Detroit
31 Mich (3-7)
Arcn Mfo Co 1701 13th Ave North (Box 817) Amplex Div Chrysler Corp P 0 8 ox 2718 Detroit 31 Mich (3-7)
Arco Mfg Co 1701 13th Ave North (Box 817) Grand Forts ND (2)
Auburn Mfg Co Pease Ave & Stack St Middletown Com (11)
Becker Bros Carbon Co 3450 S Laramie Ave Cicero 50 III (4)
Benson (Alexander R) Co Inc 2 Davis Rd New Hartford N Y (6)
Boston Gear Works 14 Hayward St Quincy 71
Mass (3)
Bound Brook Bearing Corp of America Bound Brook N J (3)
Fronze Bearings Inc 340 N Ave East Cranford NJ (3)
Bunting Brass and Bronze Co 715 Spencer St Bunting Brass and Bronze Co 715 Spencer St Toledo 1 Ohio (3) Carbon Engineering Corp P O Box 256 Slinger Wis (4) Carbon Engineering Corp P O Box 256 Slinger Wis (4)
Carbone Corp 400 Myrtle Awe Boonton NJ (3-4)
Carbone Corp 400 Myrtle Awe Boonton NJ (3-4)
Chapin (Chas E) Co Inc 227 Folton St New York 7 NY (4)
Chicago Commutator Inc Wheeling Rd & Exchange Ct Wheeling III (7)
Chicago Die Casting Mfg Co 2510-14 W Monroe St Chicago 12 III (3)
Co-operative Utilities Co Inc 4637-39 Mulberry St Phila 24 Pa (5)
Cornell-Dublier Electric Corp 333 Hamilton Blvd South Plainfield NJ (6)
Bayton Precision Mfg Co 213 N Beckel St Dayton 3 Ohio (7)
Electric Materials Co Box 390 North East Pa (7)
Emerson Plastics Corporation 1363 Seabury Ave Bronx 61 N (12)
Engelhard Industries Inc 113 Astor St Newark 5 NJ (4)
Flower (D. B) Mfg Co 1217 Spring Garden St

Flower (D B) Mfg Co 1217 Spring Garden St Philadelphia 23 Pa (5) Girard-Hopkins 1000 40th Ave Oakland 1 Calif

Green Ball Bearing Co 9518 Cassius Ave Cleveland 5 Ohio (3)

Gwilliam Co 348 Furman St Brooklyn 1 NY (3)

Han-Kor Inc 9520 Richmond Ave Cleveland 5 Ohio (7)

unio 47)
Helwig Carbon Products Inc 2550 N 30 St Mil-waukee 10 Wis (4)
Hyatt Bearings Div General Motors Corp Harrison NJ (3)

NJ (3)
Illinois Condenser Co 1616 N Throop St Chicago 22 III (6)
Industrial Engravers Inc 2212 McDonald Ave Brooklyn 23 NY (11)
Johnson Bronze Co 500 S Mill St New Castle Pa (3)
Keystone Carbon Corn. 4857 W 130 St Cleveland

Pa (3-4)

Kirkwood Carbon Corp 4857 W 130 St Cleveland 35 Ohio (4)

Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio (7-13)

Kirkwood Commutator Corp 4855 W 130 St Cleveland 35 Ohio (7-13)

Kotton Electric Mfg Co 123 New Jersey Railroad Ave Newark 5 NJ (12)

Mail Tool Co 25000 S Western Ave Park Forest 11 (9)

Marine Electric Co 195 Fremont San Francisco Calife (4) Martindale Electric Co 1383 Hird Ave Cleveland 7 Ohio (9)

7 Ohio (9)

Murray Equipment Co Inc 14011 Oakland Ave Detroit 3 Mich (2)

National Electric Coll Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (8)

New Hampshire Ball Bearings Inc Route 202 Peterborough N H (3)

Ohio Carbon Co 12508 Berea Rd Cleveland 11 Ohio (4)

Overly-Hautz Co 11500 Madison Ave Cleveland 2 Ohio (2) Pure Carbon Co Inc 441 Hall Ave St Marys Pa (4)

(4)
Pyramid Electric Co 1445 Hudson Bivd North
Bergen NJ (6)
Randail Graphite Bearings Inc Greenlawn & Lake
Sts Lima Ohio (3)
Ringsdorff Carbon Corp Box 22 East McKeesport
Pa (4-5) Rollway Bearing Co Inc 541 Seymour St Syracuse 4 N Y (3)

Russell & Stoil Co Inc 125 Barclay St NY 7 NY SKF Industries Inc Front St & Erie Ave Phila 32 Pa (3) Pa (3) St Marys Carbon Co State St St Marys Pa (3-4) Safe-T-Mike Corp 2904 Chapman Oakland 1 Calif (6) Seager Standard Carbon Co 291 Church St New York 13 NY (4)
Shenango Furnace Co Centrifugally Cast Products
Div West Third St Dover Ohio (3-13)
Southern Carbon Brush Co Inc 7 18th St SW (P 0 Box 1710) Birmingham 1 Ala (4)
Southern Electrical Equipment Co 308 W Bland at Mint St Charlotte 3 NC (13)
Sprague Electric Co North Adams Mass (6)
Stackpole Carbon Co Stackpole St St Marys Pa (3-4)
Stimple & Ward Co P O Box 1102 Pittsburgh (3-4)
Stimple & Ward Co P O Box 1102 Pittsburgh
37 Pa (8)
Stow Mfg Co 162 Shear St Binghamton NY (9)
Superior Carbon Products Co 9115 George Ave
Cleveland 5 Ohio (4-13)
Swiss Jewel Co 225 Lafayette Bldg Phila 6 Pa
(3) (3)
Toledo Commutator Co 1101 S Chestnut St Owosso Mich (7-13)
Torington Co 59 Field St Torrington Conn (3)
United States Graphite Co 1621 Holland Ave Saginaw Mich (3-4)
Waveland Electric Co 5542 N Ashland Ave Chicago 40 111 (4-5)
Wattipobyuse Electric Corp. P. O. Box 2228 Pitts wo III (4-2) Westinghouse Electric Corp P 0 Box 2278 Pitts-burgh 30 Pa (1 thru 13) Wilmington Fibre Specialty Co New Castle Del (11)

2Q. SHEETS, RODS & TUBES

Asbestos
 Cambric
 Total Assession
 Assession Assession
 Assession
 Assession
 Assession
 Assession
 Persoboard (Fullerboard)
 Plastic
 Silicone
 Silicone
 Ovanished silk

Allegheny Plastics Inc Rt 51 & Thorn Run Rd Coraopolis Pa (8)
Anchor Packing Co 401 N Broad St Philadelphia B Pa (1)
Asheville-Schoonmaker Mica Co 900 Jefferson Ave Newport News Va (5)
Auburn Mfg Co Pease Ave & Stock St Middletown Conn (1 thru 9)
Bios Laboratories Inc 17 W 60 St New York 23 NY (5-6-8-9)
Brand Dielectrics 902 Main St Willimantic Conn Brand Dielectrics 902 Main St Willimantic Conn (1-2-3-4) Chase & Sons Inc 26 Spruce St North Quincy Mass (6-8-9) Mass (6-8-9)

Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (9)

Continental-Diamond Fibre Newark Del (1-3-4)

Cottlerel Paper Co Inc 10 Purchase St Fall River Mass (6)

Electro-Technical Products Div Sun Chemical Corp 113 E Centre St Nutley 10 NJ (1-2-3-4-6-9-10) 10)

Emerson Plastics Corp 13.83 Seabury Ave Bronx 61

Riv (8)

General Electric Co Chemical & Metallurgical Div

Silicone Products Dept Waterford NV (9)

General Electric Co Insulating Materials Sec

Chemical Materials Dept 24 River Rd Schenectady 5 NV (2-4)

Glastic Corp 4321 Glenridge Rd Cleveland 21

Ohio (8)

Illumitronic Engineering Corp 680 E Taylor Ave

Sunnyvale Calif (8)

Insulation Mrfs Corp 555 W Washington Blvd Chicago 6 111 (4)

Johns-Manville 22 E 40 St New York 16 NV

(1-3)

Keasbey & Mattison Co Butler Ave Ambler Pa (1)

(1-3)
Keasbey & Mattison Co Butler Ave Ambler Pa (1)
Markel (L Frank) & Sons Norristown Pa (3)
Mica Fabricating Co 53 Central Ave Rochelle
Park NJ (4-5)
Micacraft Products Inc 701-03 McCarter Highway mark NJ (4-5)
Micacraft Products Inc 701-03 McCarter Highway Newark 5 NJ (5)
Minnesota Mining & Mfg Co Irvington Div 900 Bush Ave St Paul Minn (1-2-3-4-6-8-9-10)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1-2-4)
Mycalex Care of America Mycalex Corp of America 125 Clifton Blvd Clifton NJ (5) NJ (5) National Electric Coll Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (1-2-3-4-5-6-7-8-9) Natyar Corp 211 Randolph Ave Woodbridge NJ (2-4-8-10)

(2-4-8-10)

Panelyte Div St. Regis Paper Co Enterprise Ave Trenton NJ (8)

Penn Fibre & Specialty Co Inc 2024 E Westmoreland St. Philadelphia 34 Pa (3-4-7-8)

Permacel US Highway 1 New Brunswick NJ (1-4)

Polyken Sales Div Kendall Co 309 W Jackson Blvd Chicago 6 III (8)

Polymer Corp 2120 Fairmont Ave Reading Pa (8)

Raybestos-Manhattan Inc 61 Willett St. Passaic NJ (1)

Red Seal Electric Co 10302 Departs to 10 Control of the Control of

Red Seal Electric Co 10307 Detroit Ave Cleveland 2 Ohio (3-8)
Ruberoid Co 500 Fifth Ave New York 36 NY (1)
Silicone Insulation Inc 1383 Seabury Ave Bronx
61 NY (3-8-9)

Spaulding Fibre Co Inc 310 Wheeler St Tonawanda 125. TAPE—WOVEN & OTHERS NY (3-4-7-8) NY (3-4-7-8)

Standard Asbestos Mfg Co 860 W Evergreen Ave Chicago 22 III (1)

Stone Paper Tube Co 900 Franklin St NE Washington 17 DC (4)

Sylvania Electric Products Inc 730 Third Ave New York 19 NY (5)

Taylor Fibre Co Norristown Pa (3-8-9)

Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY (9)

Westinghouse Electric Corp P O Box 2278 Pittsburgh 30 Pa (1-3-4-5-8)

Wilmington Fibre Specialty Co New Castle Del (3-4-8)

12R. TAPE—PRESSURE-SENSITIVE (ADHESIVE)

 Cellophane
 Electrical
 Friction
 Masking
 Rubber
 Varnished cambric
 Placthe 7. Plastic 8. Color-coding 9. Corrosion-preventive

curate Mfg Co 6 Hepworth Place Garfield NJ (2-3-5-7) rican Biltrite Rubber Co Boston Woven Hose Rubber Div 29 Hampshire St Cambridge Mass chor Packing Co 401 N Broad St Philadelphia Appleton Rubber Co Inc 57 Cornwall St Boston 30 Mass (3-5-7) Mass (3-3-7)
Bishop Mfg Corp 10 Canfield Rd Cedar Grove NJ (2-5-7) Brand Dielectrics 902 Main St Willimantic Conn. Bright Star Industries 600 Getty Ave Clifton NJ (2-3-5-7) (2-3-5-7)
Clifton Mfg Co Inc Mattapan Boston 26 Mass (2-3-5-7)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (2)
Continental-Diamond Fibre Newark Del (2-7)
Dayton Industrial Products Co Melrose Park III (2-3-5-7)
Ruthon (M W) Co 330 Kinsley Ave Providence RI

unton (M W) Co 350 Kinsley Ave Providence RI (2-3) Dunt

(2-3)
Electro-Technical Products Div Sun Chemical Corp
113 E Centre St Nutley 10 NJ (1-6-7)
Emerson Plastics Corporation 1383 Seabury Americal Nr (7)
General Electric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (6-7)
GENERAL ELECTRIC SUPPLY CO 1260 Boston Ave
Bridgeport Conn (2-3-5-6-7)—ADV PG 84-85
Goodal Rubber Co 493 Whitehead Rd Trenton NJ
(3-5-7)
GRAYBAR ELECTRIC CO INC 420 Lexington Ave
NY 17 NY (2-3-4-5)—ADV PG 2
Insulation Mrts Corp 565 W Washington Blvd Chicago 6 III (3)
Johns-Manville 22 E 40 St New York 16 NY

cago 6 iii (3)
Johns-Manville 22 E 40 St. New York 16 NY
(1 thru 7)
Labelon Corp. Canandaigua NY (1)
Linton (Horace) Div Hess Goldsmith & Co Inc. 1400
Broadway New York 18 NY (2)
Mica Fabricating Co. 53 Central Ave. Rochelle Park
NJ (2)

mica papricating Co 53 Central Ave Rochelle Park NJ (2)
Minnesota Mining and Mfg Co Electrical Products Div 900 Bush Ave St Paul 6 Minn (2-5-7)
Minnesota Mining & Mfg Co Irvington Div 900 Bush Ave St Paul Minn (2-5-6-7)
Mitchell Rand Insulation Co 51 Murray St NY 7 NY (1 Hru 7)
Mystik Adhesive Products Inc 2635 N Kildare Ave Chicago 39 III (2-4-5)
National Electric Coil Div McGraw-Edison Co 800 King Avenue Columbus 16 Ohio (2-6)
Permacel US Highway 1 New Brunswick NJ (1-2-4-7)
Mass (2-5)
Ma

Mass (2-5)
Plymouth Rubber Co Inc 23 Revere St Canton
Mass (2-3-4-5-7-8-9)
Polyken Sales Div Kendali Co 309 W Jackson Blvd
Chicago 6 III (4-7)
Polymer Corp 2120 Fairmont Ave Reading Pa
(2-7)

Polymer (2-7) (2-1)
Raybestos-Manhattan Inc 61 Willett St Passaic
NJ (5-7)
Ruberoid Co 500 Fifth Ave New York 36 NY (3)
Shuford Mills Inc P 0 Drawer 340 Hickory NC
(2-4-7)

(2-4-7)
Superior Insulation Tape Co
Louis 15 Mo (3-5-7)
Topflight Corp 160 E 9th Ave
Vork Pa (1-2)
United States Rubber Co 1230 Avenue of the
Americas New York 20 NY (2-3-4-5-6-7)
Westinghous Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (2-6)

Asbestos
 Cellulose acetate
 Cotton
 Crep paper
 Polyester
 Polyester
 Polyester
 Silicone

Anchor Packing Co 401 N Broad St Philadelphia 8 Pa (1) Pa (1-7)
Auburn Mfg Co Pease Ave & Stack St Middlefown valuer Milg Co Pease Ave & Stack St Middletown Conn (1-6-8) ishop Mig Corp 10 Canfield Rd Cedar Grove NJ (6) Brand Dielectrics 902 Main St Willimantic Conn. (7-8) Brand Dielectrics 902 Main St Willimantic Conn (7-8)
Chase & Sons Inc 26 Spruce St North Quincy Mass (1-2-3-6-7-8)
Clifton Mfg Co Inc 34 Topalian St Mattapan Boston 26 Mass (7)
Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (8)
Continental-Diamond Fibre Newark Del (1-5-7-8)
Electro-Technical Products Div Sun Chemical Connecticut Div Sun Chemical Sec Chemical Beletric Co Insulating Materials Sec Chemical Materials Dept 24 River Rd Schenectady 5 NY (6-8)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 III (1-3)
Johns-Manville 22 E 40 St New York 16 NY (1)
Keasbey & Mattison Co Butler Ave Ambler Pa (1)
Minnesota Mining & Mfg Co Irvington Div 900
Bush Ave St Paul Minn (1-3 thru 8)
Mitchell Rand Insulation Co 51 Murray St NY 7
National Electric Coil Div McGraw-Edison Co 800
King Avenue Columbus 16 Ohio (7-8)
Natura Corp 211 Randolph Ave Woodbridge NJ
Trancel US Highway 1 New Brunswick NJ (7-8)
Permacel US Highway 1 New Brunswick NJ
(2-3-4-5-6-7-8)
Peters Mfg Co 162 Old Colony Ave Wollaston 70
Mass (4-5-8)
Polyken Sales Div Kendall Co 309 W Jackson Blvd
Chicago 6 III (6-7-8)
Raybestos-Manhattan Inc 61 Willett St Passaic
NJ (1) NJ (1)
United States Rubber Co 1230 Avenue of the
Americas New York 20 NY (1)
Varfiex Corp 508 W Court St Rome NY (5-6-7)
Westinghouse Electric Corp P 0 Box 2278 Pittsburgh 30 Pa (1-3-7-8)

#### 12T. FLEXIBLE SLEEVING & TUBING

1. Cotton 2. Silicone 3. Plastic 4. Rubber 5. Fiber 6. Asbestes

Allegheny Plastics Int Rt 51 & Thorn Run Rd Corapolis Pa (3) Alpha Wire Corp 200 Varick St New York 14 NY (2-3-4-5) (2-3-4-5)
Atlas Asbestos Co 423 Walnut St North Wales
Pa (6)
Automatic Vulcanizers Corp 16 Hudson St New
York 13 NY (4)
Brand (William)-Rex Div American Enka Corp 31
Sudbury Rd Concord Mass (1-2-3)
Continental-Diamond Fibre Newark Del (2-3-5)
Electra Insulation Corp 33-30 57th St Woodside
77 NY (5)
Empron Plastics Corp 1383 Saphury Ave Brong 61 Em Plastics Corp 1383 Seabury Ave Bronx 61 NV (3) Go Rubber Co 493 Whitehead Rd Trenton NJ (3.4) Hewitt-F Robins 666 Glenbrook Rd Stamford Conn Hitemp Wires Co 1200 Shames Dr Westbury NY Sunnyvale Calif (3) Sunnyvale Calif (3)
Insulation Mfrs Corp 565 W Washington Blvd Chicago 6 III (1-2)
Johns-Manville 22 E 40 St New York 16 NY (6)
Keabey & Mattison Cs Butler Ave Ambler Pa (6)
Minnesota Mining & Mfg Co Irvington NY (2)
Minnesota Mining & Mfg Co Irvington Div 900
Bush Ave St Paul Minn (1 thru 5)
Mitchell Rand Insulation Co 51 Murray St NY 7
NY (1-2-5)
National Electric Coil Div McGraw-Edison Co 800
King Avenue Columbus 16 Ohio (1-2)
Natvar Corp 211 Randoiph Ave Woodbridge NJ
(2-3)
Permanel IIS Highway 1 New Powerson (2-3)
Permacel US Highway 1 New Brunswick NJ (3)
Permacel US Highway 1 New Brunswick NJ (3)
Polymer Corp 2120 Fairmont Ave Reading Pa (3)
Saylor Electric Products Corp 277 Pierce St Birmingham Mich (1-3-5)
Snyder (M L) & Son Inc 1897 E York St Phila 25 Snyder (M L Pa (3-4)

Stone Paper Tube Co 900 Franklin St NE Washington 17 DC (3-5)
Suffex Corp 33-40 57th St Woodside 77 NY (1-2-3-4)
United States Rubber Co 1230 Avenue of the Americas New York 20 NY (3-4)
Varflex Corp 508 W Court St Rome NY (1 thru 5)
Westline Products Div Western Lithograph Co 600 E Second St Los Angeles 54 Calif (3)
Wilmington Fibre Specialty Co New Castle Del (5)

## 12U. INSULATING MATERIALS-MISCELLANEOUS

Beads Cable wrapping Cement 3. Cement quartz
4. Fused quartz
5. Insulating compounds
6. Varnished carves (duck cloth)
7. Insulating paint
8. Porcelain insulating products
9. Slate
10. Switchboard mats
11. Varnish
12. Asbestos, ebony & sagastone Asbestos, ebony & soapstone Insulating paper & cloth Motor encapsulating kits

All-State Welding Alloys Co Inc. 249-55 Ferris Ave White Plains NY (5)
American Products Mig Co Inc. St New Orleans 18 La (5)
Aries Laboratories Inc. 45-35 Davis St Long Island City 1 NY (5)
Alias Asbestos Co 423 Walnut St North Wales Pa (3)
Automatic Vulcanizers Corp 16 Hudson St New York 13 NY (5)
Barrett Varnish Co 1532 S 50th St Cicero 50 III (3-7-11)
Bios Laboratories Inc. 17 W 60 St New York 23 os Laboratories Inc 17 W 60 St New York 23 NY (3-5-7-11) NY (3-5-7-11)
Blackburn (Jasper) Corp 1525 Woodson Rd St
Louis 14 Mo (5)
Borthig (George C) Co Inc P 0 Box 115 East
Rutherford NJ (3-5-7-11)
Brand Dielectrics 902 Main St Willimantic Conn
(2-6) Central Scientific Co 1700 Irving Pk Rd Chicago 13 III (3) Connecticut Hard Rubber Co 407 East St New Haven 9 Conn (3) Cook's Sons (Adam) Inc 5 N Stiles St Linden NJ (5)

Haven 9 Conn (3)
Cook's Sons (Adam) Inc 5 N Stiles St Linden NJ
(5)
Cottrell Paper Co Inc 10 Purchase St Fall River
Mass (12)
Delta Chemical Works Inc 23 W 60 St New York
23 NY (3-5-7-11)
Dolph (John C) Co Monmouth Junction NJ (5-11)
Down Corning Corp Midland Mich (5-11-14)
Eagle-Picher Co American Building Cincinnati 1
Ohio (3-5)
Electro-Technical Products Div Sun Chemical Corp
113 E Centre St Nutley 10 NJ (6)
Engelhard Industries Inc 113 Astor St Newark 5
NJ (4)
G & W Electric Specialty Co 3500 W 127 St
Blue Island III (5)
General Electric Co Chemical & Metallurgical Div
Silicone Products Dept Waterford NY (5-11)
General Electric Co Insulating Materials Sec
Chemical Materials Dept 24 River Rd Schenectady 5 NY (3-5-6-7-11)
General Electric Co Insulating Materials Sec
Chemical Materials Dept 24 River Rd Schenectady 5 NY (3-5-6-7-11)
Godrich (B F) Chemical Co 3135 Euclid Ave
Cleveland 15 Ohio (5)
Hardman (H V) Co Inc 571 Cortlandt St Belleville 9 NJ (5)
Hubbard & Co 6301 Butler St Pittsburgh 1 Pa
(8)
I-T-E Circuit Breaker Co 1900 Hamilton St Philadelphia 30 Pa (8)
I-T-E Circuit Breaker Co Victor Insulators Div
Victor NY (8)
Illinois Edison Porcelain McGraw-Edison Co 510 N
Pearl St Maccomb III (8)
Illumitronic Engineering Corp 680 E Taylor Ave
Sunnyvale Calif (2)
Induction Heating Corp Stirling NJ (1-12)
Johns-Manville 22 E 40 St New York 16 NY
(3-5-12)
Joy Mfg Co Electrical Products Div 1201 Macklind
Ave St Louis 10 Mo (5)
Keasbey & Mattison Co Butler Ave Ambler Pa

Mfg Co Electrical Products Div 1201 Macklind Ave St Louis 10 Mo (5) Keasbey & Mattison Co Butler Ave Ambler Pa (12)

Lap Insulator Co Inc 35 Gilbert St Leroy NY (8)
Lastik Paint Inc 200 S Craig St (Suite 406)
Pittsburgh 13 Pa (11)
Lint (Clyde W) 2323 W 18 St Chicago 8 III (8)
Martindale Electric Co 1383 Hird Ave Cleveland 7
Ohio (1-3)
Maryland Lava Co Box 127 Bel Air Md (12)
Midland Industrial Div Harrison Paint & Varnish Co
1329 Harrison Ave SW Canton 1 Ohio (7)
MINERALLAC ELECTRIC CO 25 N Peoria St Chicago 7 III (5)—ADV PG 108
Minnesota Mining and Mfg Co Electrical Products
Div 900 Bush Ave St Paul 6 Minn (5)

Minnesota Mining & Mfg Co Irvington Div 900
Bush Ave St Paul Minn (2-6-7-11)
Mitchell Rand Insulation Co 51 Murray St NY 7
NY (5-6-7-11)
National Electric Coil Div McGraw-Edison Co 800
King Ave Columbus 16 Ohio (6)
Natvar Corp 211 Randolph Ave Woodbridge NJ
(6)
New Jersey Porcelain Co Inc Plum St & NY Ave
(P 0 Box 908) Trenton 5 NJ (8)
PLM PRODUCTS INC 3871 W 150 St Cleveland 11
Ohio (5)—ADV PG 102
Permacel US Highway 1 New Brunswick NJ
(5-11) Permacei (5-11) Peters Mfg Co 162 Old Colony Ave Woolaston 70 Mass (5) Rubber Co Inc 23 Revere St Canton Mass (5) Mass (5)
Procelain Products Co 224 N Patterson St Carey
Ohio (8)
Portland-Monson Slate Co 465 Congress St Portland 3 Me (9)
Pyrosil Inc 1889 Front St Cuyahoga Falls Ohio
(4) Quigley Co Inc 415 Madison Ave New York 17 NY (3-7) Raybestos-Manhattan Inc 61 Willett St Passaic NJ (10) Raypestos-Manhattan Inc 61 Willett St. Passaic N.J. (10)
Rusgreen Mfg Co. 14262 Birwood Ave Detroit 38 Mich (5)
Sauereisen Cements Co. 1045 N. Canal St. Pitts-burgh 15. Pa. (3-5-7)
Saxonburg Ceramics Inc. P. 0. Box. 157 Saxonburg Pa. (1-8)
Schenectady Varnish Co. Inc. Congress & 9th Sts. Schenectady 1. NY (5-11)
Seton Name Plate Co. Inc. 50 Fitch St. New Haven 15. Conn. (12)
Sherwin-Williams Co. 101 Prospect Ave NW. Cleveland 1. Ohio (5-7-11)
Standard Asbestos Mfg. Co. 860 W. Evergreen Ave. Chicago 22. 111 (3-13)
Star Porcelain Co. Muirhead Ave. Trenton 9. NJ. (1-8)
Thermal American Fused Quartz Co. 18 Salem St. Chicago.

(1-8)

Thermal American Fused Quartz Co 18 Salem St Dover NJ (4)

Union Carbide Corp Silicones Div 30 E 42 St New York 17 NY (5-11)

United States Rubber Co 1230 Avenue of the Americas New York 20 NY (10)

Wilbur & Williams Co Inc 650 Pleasant St Norwood Mass (7)

Zippertubing Co 752 S San Pedro Los Angeles 14 Calif (2)

12V. EXPENDABLE SUPPLIES, MISCELLANEOUS

Armature banding
Banding & lacing twine
Beeswax
Cleaning compound
Commutator cement
Flux & paste
Impregnating compound
Rust & corrosion preventi 7. Impregnating compound
8. Rust & corrosion preventives
9. Stot wedges & sticks
10. Solder
11. Wire-stripping and pulling compound
12. Wire & cable tags & markers
13. Controller contacts & fingers
14. Heat-conducting compounds
15. Solenoid & magnet coils
16. Cable sealing compound
17. Wood preservative
18. Thread lubricant
19. Brazing elloys
20. Graphite & electrodes

Insulation and tape are listed individually under 12Q, R, S, T and U in this section.

All-State Welding Alloys Co Inc 249-55 Ferris Ave White Plains NY (6-10-19) Allen (L B) Co Inc 5624 N Newark at Bryn Mawr Chicago 31 III (6-10) Alpha Metals Inc 60C Water St Jersey City 4 NJ Alpha Métals Inc 60C Water St Jersey City 4 NJ (6-10)
American Products Mfg Co Inc 8127-33 Oleander St New Orleans 18 La (7)
American Silver Co Inc Industrial Div 36-07 Prince St Flushing 54 NY (6)
American Solder & Flux Co 19th & Willard Sts Phila 40 Pa (6-8)
Anaconda Wire & Cable Co 25 Broadway New York 4 NY (12)
Anchor Metal Co Inc 966 Meeker Ave Brooklyn 22 NY (6-10)
Arsco Mfg & Sales Corp 438 Tenth Ave New York 1 NY (8)
Automatic Vulcanizers Corp 16 Hudson St New York 13 NY (7-8)
Becker Bros Carbon Co 3450 So Laramie Ave Cicero 50 III (20)
Benson (Alexander R) Co Inc 2 Davis Rd New Hartford NY (6-10)
Berry (William B) Co 117 Causeway St Boston 14 Mass (12)
Bios Laboratories Inc 17 W 60 St New York 23 NY (3-4-6-7-8-9-10) Bios Laboratories Inc 17 W 60 St New York 23 NY (3-4-6-7-8-9-10)

Brady (W H) Co 727 W Glendale Ave Milwaukee 9
Wis (12)
Brand (William)-Rex Div American Enka Corp 31
Sudbury Rd Concord Mass (12)
Bryant Mfg Co 410 N Paulina St Chicago 22
III (12)
Burnley Battery & Mfg Corp 103 Clay St (P 0
Box 511) North East Pa (6)
Cable Electric Products Inc 234 Daboll St Providence 7 RI (6-10)
Cannon Electric Co 3208 Humboldt St Los Angeles 31 Calif (15)
Carboline Co 32 Hanley Industrial Ct St Louis 17
Mo (8)
Carbolineum Wood Preserving Co 6683 N 40 St Mo (8)
Carbolineum Wood Preserving Co 6683 N 40 St
Milwaukee 9 Wis (8-17)
Chapin (Chas E) Co Inc 227 Fulton St New York
7 NY (13)
Chemallov Electronics Corp Gillespie Field Santee Chemalloy Electronics Corp Gillespie Field Santee Calif (10) Cook's Sons (Adam) Inc 5 N Stiles St Linden NJ Cool-Amp Co 8603 W 17 Ave Portland 19 Ore (14) (14)
Crown Industrial Products Co 713 Amsterdam St Woodstock III (8)
Pelta Chemical Works Inc. 23 W 60 St New York 23 NY (3-46-7-8-10)
Division Lead Co 7742 W 61st Place Summit III (6-10-11)
Pow Coming Copp. Midland Mich (7-8) (6-10-11) Dow Corning Corp Midland Mich (7-8) Dunton (M W) Co 350 Kinsley Ave Providence RI (6-10) Eagle Electric Mfg Co Inc 23-10 Bridge Plaza South Long Island City 1 NY (6) Early (Edward E) Co 1129 5th St N W Canton 3 Ohio (5) Electrical Fittings Corp 37-50 57th St Woodside 77 NY (11) Electrical Windings Inc 2015 N Kolmar Ave Chicago 39 III (15)

ELECTRO COMPOUND CO 4145 W 150 St (P 0 Box 2772) Cleveland 11 Ohio (11, 18)—ADV PG 122 Engelhard Industries Inc 113 Astor St Newark 5 NJ (6-10)

PG 122
Engelhard Industries Inc 113 Astor St Newark 5
NJ (6-10)
Farrelloy Co 1245 N 26th St Phila 21 Pa
(6-8-10)
Federated Metals Div American Smelting & Refining Co 120 Broadway New York 5 NY
(6-10)
Fldelity Chemical Products Corp 470 Frelinghuysen
Ave Newark 12 NJ (4-8-11)
General Electric Co Chemical & Metallurgical Div
Silicone Products Dept Waterford NY (77)
Glastic Corp 4321 Glerridge Rd Cleveland 21
Ohio (9)
Hardman (H V) Co Inc 571 Cortlandt St Belle-Hardman (H V) Co Inc 571 Cortlandt St Belleville 9 NJ (7)

Ideal Industries Inc 5136 Park Ave Sycamore III (5-11)
Insulation Mfrs Corp 565 W Washington Blvd Chicage 6 III (2-9)
Johns-Mamville 22 E 40 St New York 16 NY (8-19)

(8-19)
Johnson Mfg Co Inc 600 Anamosa Rd Mt Vernon
Iowa (6-10)
Johnston Foil Mfg Co 6106 S Broadway St. Louis
11 Mo (10)
Jordan Co 51st & Merrimac Ave Chicago 38 III
(6)
Kester Solder Co 4201 Wrightwood Ave Chicago
39 Illinois (6-10)
Keyes-Davis Co 89 14th St Battle Creek Mich
(12) Keyes (12) Lenk Mfg Co Franklin Ky (6-10) Lint (Clyde W) 2323 W 18 St Chicago 8 III (11) London Chemical Co Inc 1535 N 31 Ave Melrose Park III (6-11) 

Monitor Controller Div Atlee Corp 99 Grove St Rockland Mass (13)
National Band & Tag Co 721 York St Newport Ky (12)
National Electric Coil Div McGraw-Edison Co 800 King Ave Columbus 16 Ohio (1-2-7-9-10)
National Lead Co 111 Broadway NY 6 NY (6-10)
North Shore Nameplate Div Anodyne Inc 1270 N W 165 St North Miami Beach Fla (12)
Northwoods Mfg Chemists Inc Porterfield Wis (4)
Okun (A L) Co Inc 109-02 Van Wyck Expressway South Ozone Park NY (10)
Page Steel & Wire Div American Chain & Cable Co Inc P 0 Box 692 Monessen Pa (1)
Penetone Co 74 Hudson Ave Tenaffy NJ (4-8)
Penn Fibre & Specialty Co Inc 2024 E Westmoreland St Phila 34 Pa (12)
Permacel U S Highway 1 New Brunswick NJ (4-7)
Plymouth Rubber Co Inc 23 Revere St Canton Mass (18)
Porcelain Products Co 224 N Patterson St Carey Ohio (10)
Premex Products Div Chisholm-Ryder Co Inc College & Highland Aves Niagara Falls NY (12)
River Smelting & Refining Co 4195 Bradley Rd (P O Box 5755) Cleveland 1 Ohio (10)

Ruby Chemical Co 68-70 McDowell St (P 0 Box 1108) Columbus 16 Ohio (6-10) Rust-Oleum Corp 2425 Oakton St Evanston III Rust-( (8)
Sherwin-Williams Co 101 Prospect Ave N W Cleveland 1 Ohio (7)
Silicone Insulation Inc 1383 Seabury Ave Bronx 61 NY (9)
Sittler Corp 18 N Ada St Chicago 7 III (5)
Smith Welding Equipment Corp 2633 4th St S E Minneapolis 14 Minn (6)
Stackpole Carbon Co Stackpole St St Mary Pa (15) (13)
Subox Inc Fairmont Plant Hackensack NJ (8)
Sulfo Inc 1143 E Jersey St Elizabeth 4 NJ (8)
Superior Carbon Products Co 9115 George Ave
Cleveland 5 Ohio (13)
Thermon Mfg Co 1017 Rosine St Houston Tex
(14) (14) Rosine St. Houston Fex. (14) Turco Products Inc. 24600 S Main St. Wilmington Calif (4-8) Union Carbide Corp. Silicones Div. 30 E. 42 St. New York 17 NY (7-16) United Wire & Supply Corp. 1497 Elmwood Ave. Providence 7 RI. (6-10) Waveland Electric Co. 5542 N. Ashland Ave. Chicago 40 III (4-5-8-13) Westinghouse Electric Corp. P. 0. Box. 2278 Pitts-burgh 30 Pa. (13) Westine Products Div. Western Lithograph Co. E. Second St. Los Angeles 54 Calif (12) Williams Co. Inc. 650 Pleasant St. Norwood Mass. (8) Wilmington Fibre Specialty Co New Castle Del Zippertubing Mfg Co 13000 S Broadway Los Angeles 61 Calif (12)

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# July, 1960 through June, 1961

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